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INDUSTRIAL
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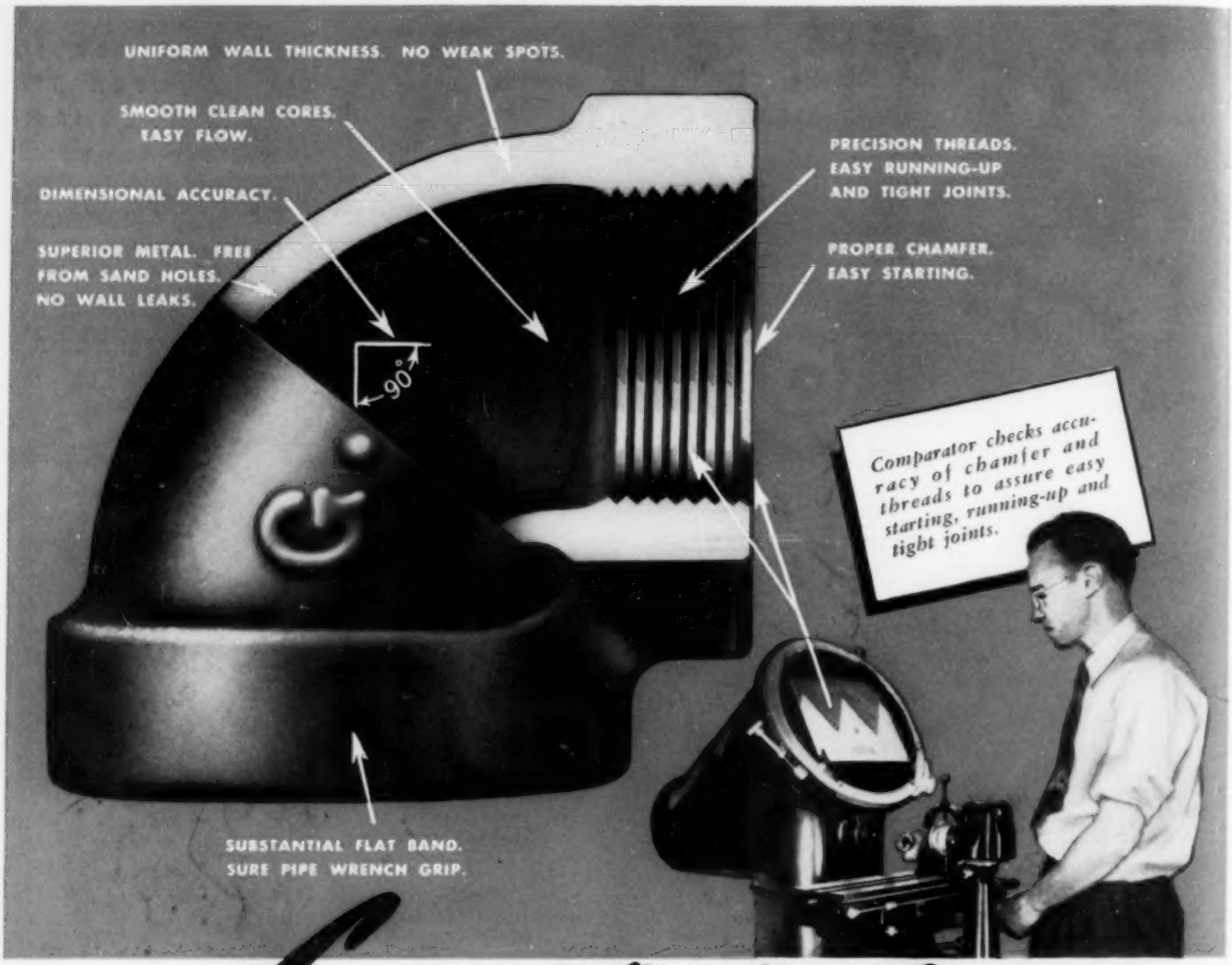
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AIR CONDITIONING EXPANDS RAPIDLY

Carrier Corp. faces 1947 with the biggest backlog of orders in its history, reflecting a steadily mounting demand for air conditioning both in this country and abroad, according to Cloud Wampler, president.

Orders booked by the company during 1946 totalled $40,000,000, but due to severe shortages of materials, completed contracts and sales totalled only $23,000,000, Mr. Wampler said.

"This figure, however, establishes a new peacetime record," he declared, "and it was reached in spite of severe materials and parts shortages caused by strikes in other industries, Carrier itself having maintained its unbroken record of no loss of production due to internal labor troubles.

"The air conditioning industry as a whole is in the midst of a period of rapid expansion," Mr. Wampler continued. "Because of widespread wartime applications, the usage and acceptance of air conditioning has been advanced as much as 10 years." Total 1947 sales of the industry, in his opinion, should amount to three to four times the prewar volume.

Among the largest buyers in the industry category are precision manufacturers who find it difficult to achieve extremely close tolerances where temperature and humidity conditions are variable. Other industries where true air conditioning is vital, such as in the manufacture of textiles, pharmaceuticals, chemicals, foods, and many others, will also be big buyers, Mr. Wampler predicted.

"Commercial establishments such as restaurants, department stores, theaters, and food markets represent a vast potential market," he continued. Foreign demand, particularly from the tropics, is rapidly increasing, as indicated by an increase of 183 per cent in Carrier's foreign orders in 1946 over 1945.

"An important development, from the standpoint of the public as well as the industry, is the heavy demand from the transportation field. All railway passenger cars built this year have been air conditioned. Nearly every intercity bus built is fully air conditioned for passenger comfort, while scores of giant new passenger planes are incorporating this feature.

"Railway car builders have orders for nearly 3000 air conditioned passenger cars, while Carrier alone has produced or is producing air conditioning equipment for more than 3500 intercity busses."

During 1947, Carrier will embark upon the greatest expansion program in its history, based upon occupancy and utilization of an ultramodern war plant near Syracuse recently purchased from the government.

In the past year Carrier employment reached a total of 4500, almost double that of 1941.

ENTERING A "DYNAMIC PHASE"

"We are now entering one of the most dynamic phases our industrial economy has ever seen," according to L. M. Cassidy, vice-president of the Johns-Manville Corp., in a year end review of the building industry, "and we can anticipate a rapid obsolescence of machinery and methods, as this country's industries install new machinery and adopt new methods of manufacture to capture their markets.

"Particularly due to the unprecedented rise in production costs, a wave of increased mechanization and industrial plant streamlining has become almost a vital necessity to keep prices within consumer buying limits," he remarked.

"In 1946, government controls and labor unrest impeded much of the progress which might normally have been expected in that period but for the next four or five years, there is the prospect of a substantial volume of activity in the manufacturing and heavy construction industries", Mr. Cassidy said.

Those industries which can spend money and expand now have an excellent opportunity to improve their business position, according to Mr. Cassidy. Every company, both old and new, will be engaged in a vigorous competition for markets, and particularly must the older companies build and expand not only to meet the competition from the war-strengthened newer companies but to maintain the progress which they demonstrated before the war in producing more and better goods for the public for less money, he believes.

INDUSTRY'S NO. 1 PROBLEM FOR 1947 SUMMARIZED

Because it so well reflects the major problem facing industry during 1947, we print here extensive ex-

THE EDITOR'S PAGES

tracts from a year-end statement by Gwilym A. Price, president of the Westinghouse Electric Corp.:

"To emphasize the seriousness of the problems that confronted our business in the first full year of peace, we estimate that the operating loss of the Westinghouse Electric Corp. for 1946 will amount to more than $50,000,000. This is a staggering loss considering the fact that the company's total losses in the three worst years of the depression amounted to $21,196,040.

"Westinghouse sustained this operating loss despite the fact that its dollar volume of production has been greater in 1946 than in any peacetime year prior to 1941.

"Fortunately the carry-back feature of the wartime tax law has protected the company against this abnormal loss which, otherwise, would have been a crippling blow to its financial strength and to the job security of its 96,000 employees. Even after giving effect to the recovery provisions of the tax law, our net income on $254,338,189 of sales in the first 11 months of this year is but $4,411,481.

"Westinghouse cannot look to tax carry-backs to protect it against losses in 1947. No tax law can assure wages or profits; only the ability to make a good product and sell it competitively can do that.

"On the brighter side, Westinghouse approaches the end of 1946 with $573,069,453 of orders on its books. This is the greatest backlog in the peacetime history of the company. The production of this volume of goods ordinarily would assure our employees steady work and would return to the company a fair profit. These are, however, not ordinary times. We have been up against conditions that are unique in the experience of this generation.

"Industry's ability to produce has not matched the demand for its prod-

THE EDITOR'S PAGES

ucts. Long costly strikes, shortages of critical materials due in large part to unrealistic and inadequate pricing policies under government controls have lowered some industries' production levels below capacity.

"Some of these abnormal conditions are still with us. In durable goods industries at least they promise to continue well into 1947. Costs have risen so steeply that the overall cost of manufacturing and selling our products in the last six months averaged 111 per cent of the prices at which we sold them. That means we had to spend $1.11 to produce and market a product for which we received $1. In other words we lost 11 cents on every dollar's worth of business in this period.

"We are still operating at a loss near the end of the year, largely because of higher labor costs and material shortages and the further fact that because of the long production period of some of our apparatus we are still producing and shipping products at previously contracted prices which were at or below those of 1939.

"It is instructive to balance the 1946 record of Westinghouse operating losses and meager net income against the statements of those who charge American industry with making 'staggering' and 'unconscionable' profits out of which increased wage scales could be paid.

"It is true that total profits of all corporations in 1946 will be large compared with any peacetime year since 1929. They should be large in a year of near-capacity production. No past peacetime year has approached 1946 in dollar volume of production, in national income, and in wages and salaries paid to individuals.

"The CIO, in its publication 'Economic Outlook,' estimates full year 1946 net income (after taxes) of all corporations at the high figure of $11.8 billions. This is a high figure, but we hope it will prove correct.

"Actual net income in the past has never exceeded the $10 billion of 1943. But suppose we use this CIO estimate of $11.8 billion, and compare it with actual net income of other prosperous years of full employment (dollar figures are in billions, those for '46 being estimated):

Year	Total National Income	Corp. Net Income	Corporations' Share of National Income
1929	$ 80.2	$ 7.6	9.5%
1943	149.4	10.0	6.7%
1946	165.0	11.8	7.1%

"Even by using this high estimate of 1946 corporation income, the part of the national income represented by corporation net income is not out of line with other years of full employment.

"Profits are neither 'staggering' nor 'unscrupulous,' nor dangerous to business stability. On the contrary, they are necessary so that corporations can increase and improve their facilities and provide more jobs. Corporations should apologize when they fail to earn profits—not when they succeed. American industry has expanded; productivity has been increased; and wages have been multiplied three and four times only because corporations, as a group, have been able over the years to operate at a profit.

"More recently estimates have been made that next year's corporation profits (after taxes) would reach the stupendous figure of $15 billion—50 per cent above the wartime profit peak.

"Of course, nobody knows what 1947 profits will turn out to be, but —again—we hope this conjecture proves correct. We hope it will be correct because total wage and salary payments have always gone up when profits have gone up, and wages and salary payments go down when profits go down. The only difference is that profits go up faster in times of good business, and go down faster —and completely disappear—with poor business.

"These facts of American experience show the fallacy of the argument —that increased wages come out of reduced profits. Increased wages and increased profits both come out of prosperous business, good management, and cooperative labor.

"Despite the difficulties under which Westinghouse operated in 1946, we produced $254,338,189 in the first 11 months, substantially more than in any comparable period before 1941. Our shipments in October reached $41,832,237—a peacetime record.

"The cost of labor, with its resulting effect on the cost of materials, is largely responsible for setting the price at which a company must sell its products to stay in business. Labor costs represent at least 85 per cent of the total cost of production and distribution in the United States, if the total step by step process—from farm or mine to the final consumer—is taken into account.

"Now as we move into 1947, OPA price controls have been lifted. However, freedom to raise prices does not of itself assure prosperity either for companies or their employees. Westinghouse is convinced that it must keep prices as low as possible, to maintain sales and employment.

"To sum up, Westinghouse has made substantial progress during 1946 in its $132,000,000 postwar expansion and reconversion program. We now have more business than ever before in peacetime; we have the increased facilities to set new production records if material scarcities are overcome; and we have more than 96,000 employes to do the job. For the nation and Westinghouse 1947 can be the best of all our years."

CONTROL INDUSTRY TO EXPAND IN 1947

The year ahead will see further expansion on the part of the automatic controls industry, according to Harold W. Sweatt, president of the Minneapolis-Honeywell Regulator Co. This will follow a record year which saw production and sales at new peacetime highs despite all the difficulties of production, shortages of raw material, and scarcities of trained manpower.

Although the industry as a whole was unable to make any substantial reduction in its backlog of orders and thus enters 1947 with almost a full year's orders already on the books, it is generally expected that the close of the year will witness the return of the type of market which will require the intensified selling which characterized the industry prior to the war, Mr. Sweatt says.

Productive facilities are being expanded throughout the entire industry. Minneapolis-Honeywell, as an example, produced more than twice the number of instruments in 1946 than in its best prewar year. Production schedules for 1947 are larger than in 1946.

Heating Piping & Air Conditioning

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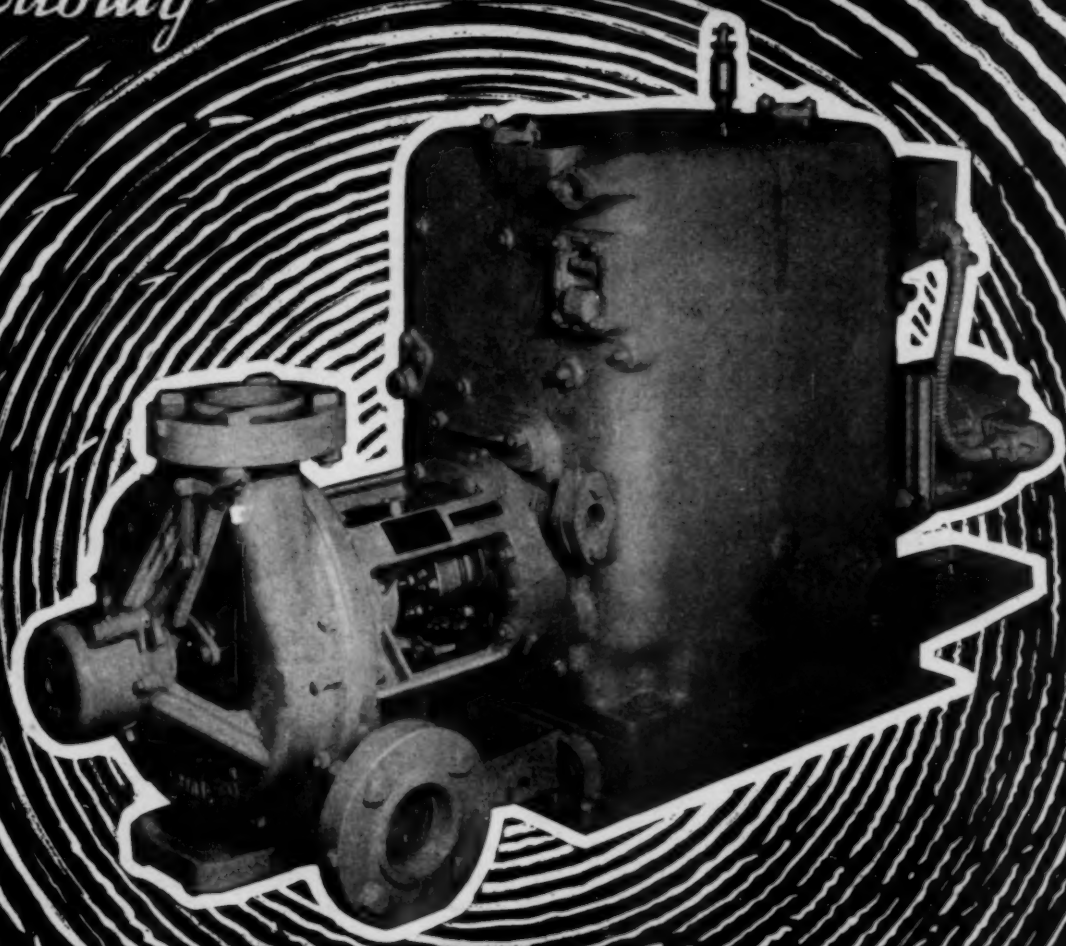
Centralized Heating Economy



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IMPROVES PERFORMANCE

Redesigning Boiler Fireboxes

Robert H. Wilder & Kalman Steiner

Tell How Three Industrial Boilers Were Modernized for Better Results

DESIGN OF THE furnaces for industrial boilers of major size receives the best attention of the engineering fraternity. The same practice does not always prevail in the operation of moderate size boilers ranging up to about 150 hp, such as are extensively employed in small industrial applications. Even today—under the advanced engineering practices which prevail—numerous boilers of such sizes are installed with inadequate and improperly designed combustion space. This is particularly true of certain types of water leg boilers.

Radical Alterations Often Necessary

Where existing boilers of such sizes are converted to mechanical firing, in many cases they continue to employ firebox designs and furnace settings which are suitable only for hand firing, and no attempt is made to apply to such conversions the same sound engineering principles employed in the conversion of larger boilers. When such boilers are converted to mechanical firing, there arise serious problems of combustion. chamber design, and in certain cases radical alterations of the original setting become necessary if satisfactory results are to be obtained.

Three typical types of high pressure boilers of the kind frequently used in small industrial plants, such as laundries and dairies, are discussed here. These three boilers had originally been set in what might be termed the conventional manner. All three boilers gave considerable trouble, frequently being shut down for maintenance of grates or tuyeres, or for refractory repairs. In all three cases, marked improvement in boiler performance was obtained by redesigning the furnace settings.

A rigid analysis had to be made of the combustion requirements of each boiler, and a new setting designed for each that would take into account the special nature of the boiler type involved. A similar solution was worked out for all three, but the diversity of boiler types required a diverse approach in each case.

The three plants concerned were interested principally in ample steam to meet peak loads, lowest possible fuel cost, freedom from attention to the fire with a widely and rapidly varying load, and minimum maintenance and repairs. The particular territory where these plants are situated offered a choice between coal and fuel oil on a competitive basis, but gas was not feasible because of its cost. The choice was fuel oil.

FURNACE DESIGN for industrial boilers of major size receives careful engineering attention, but this is not always true of moderate size units. When such boilers are converted to mechanical firing, radical alterations of the original settings become necessary if satisfactory results are to be obtained. . . . Mr. Wilder, of the Plibrico Sales and Service Co., and Mr. Steiner, of C. Hoffberger Co., describe here three actual examples where performance was greatly improved by alteration of the boiler fireboxes.

30,000 Btu Heat Release Rate

It then became necessary to lay out the changes and alterations that would be required in the settings to permit the boilers to meet the plant requirements. At the outset, it was decided to design for a heat release rate at maximum load of 30,000 Btu per hr per cu ft of combustion space. Provided other elements of the installation are properly designed, this basis of furnace volume will assure good combustion efficiency, long refractory life, and high overload capacity. Wherever possible, the new furnace construction was to embody air cooling of the refractories.

Air cooling of walls and arches has the double advantage of prolonging refractory life and of preheating combustion air. It introduces the minor complication that air flow cannot be regulated from a damper in the secondary air duct, but must be regulated from the breeching. Air cooling the floor only, however, can be accomplished by the use of an air duct under the floor, permitting the use of a conventional secondary air damper at its inlet.

The new designs called for extensive modifications of the boiler settings. To convert from the original to the new settings meant tearing out the original foundations, provid-

ing new foundations, erecting complete new furnaces, and supporting the new refractory linings. Before the old foundations could be torn out, however, it was first necessary to support the boilers on cribbing, independently of the old foundations. Each boiler presented a unique problem in itself, the exact details of which can best be presented by discussing each separately.

50 Hp Vertical Boiler

The first was a hand fired vertical boiler with a nominal rating of 50 hp. Such a boiler is ordinarily supported on a circular steel base which forms the ashpit when burning coal. Where such a boiler is equipped with an oil burner, the burner is sometimes installed in the ashpit, providing a combustion chamber entirely inadequate in size. More often, however, when an oil burner is installed a short dutch oven is constructed with a horizontal sprung arch serving as the roof. Because of the confined space and lack of black surface exposed to the radiant heat of the fire, such construction leads to high firebox temperature and results in rapid burning out of the refractory lining.

More effective results can be obtained with this type of boiler by supporting it externally instead of on the conventional base. It is a simple matter to weld supporting brackets to the outside shell, making it possible to carry the weight of the boiler from the shell instead of from the mud ring. To permit removing the old base and foundation, temporary support must be provided from overhead, as by a beam from which steel rods can be dropped to engage holes in the new brackets.

The setting can then be excavated to the desired depth and a new floor laid, new supporting walls can be built up to the brackets, and the boiler weight transferred thereto. For these new supporting walls, because of its better heat resistance, red brick is preferred to concrete. As the red brick are laid, alloy steel hooks are set into the brickwork at regular intervals where, later, corresponding anchors will be used to properly tie the plastic refractory in place while allowing ample provision for expansion and contraction.

The excavation must be deep enough to provide not only the required combustion space but to allow a sloping flat arch to be built as the roof of the dutch oven extension.

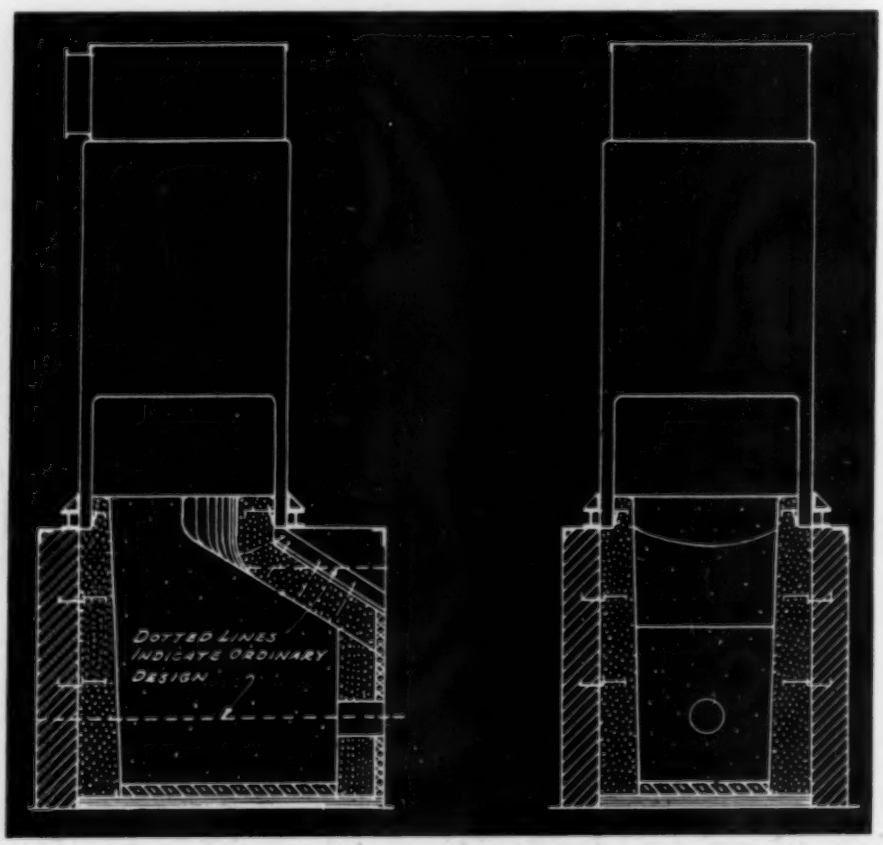
To suspend this arch across the new red brick walls, use is made of alloy steel arch hangers which in turn are attached to a steel framework. A steel front plate across the mouth of the furnace extension completes the structure and holds the burner in its firing position. The entire system is quite similar to that erected for the two pass, fire tube boiler, in the discussion of which following certain additional details will be brought out. It should be mentioned, however, that the new combustion space is laid out as a rectangle within the red brick base, the plastic refractory being shaped to make a transition from the rectangular base to the circular waterleg.

25 Hp Water Tube Boiler

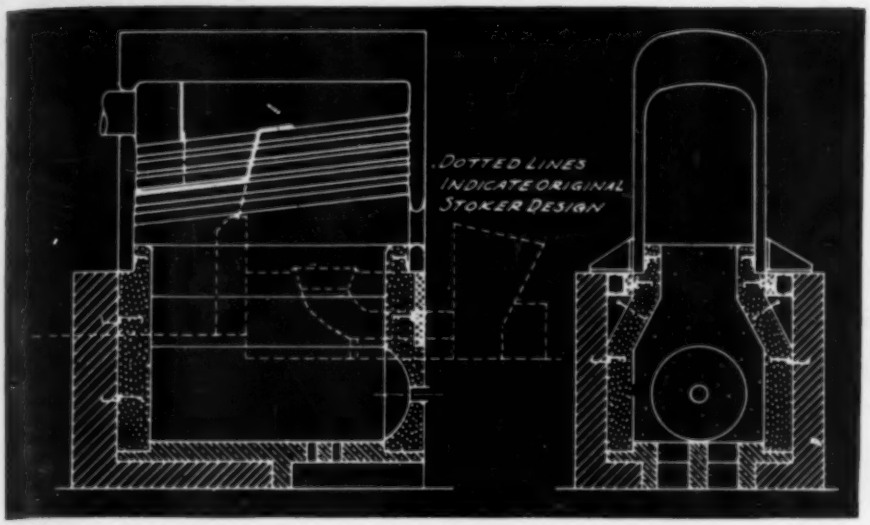
The second boiler was a 25 hp water tube boiler with water legs—unable to develop even its normal rating, smoking almost continuously, consuming high grade coal at a very low efficiency, and in no way meeting steam requirements of the laundry where it was installed.

The water tube boiler, as it had been arranged for stoker firing, had a bridge wall at about the midpoint of the boiler length, from which point a baffle ascended vertically to form the first and second passes of a total of three. The bridge wall and baffle completely shielded from radiant heat half of the water leg and half of the lower two rows of tubes. In converting the setting for oil firing, the bridge wall was removed and the firebox extended the entire length of the boiler, thereby almost doubling the amount of surface exposed to radiant heat. A steel baffle plate was laid over the second row of tubes from the back of the boiler up to the vertical baffle, forming the first pass.

As in the case of the vertical boiler already described, it was necessary to provide external brackets to support the boiler from new walls which formed a base wider than the original. The width of the new firebox was increased considerably beyond the width between water legs, and the firewalls approaching the level of the water leg were tapered inward to form the transition. The tapered por-



A 50 hp vertical boiler converted to oil firing showing recommended firebox design with sloping suspended arch. Dotted lines show ordinary design with horizontal sprung arch. The ordinary design results in high furnace maintenance because of the small amount of black surface exposed to radiant heat



A 25 hp water tube boiler with water legs surrounding the firebox which was converted to oil firing. Dotted lines show the original proportions of the firebox which were greatly increased when an oil burner was installed by extending firebox the full length of the boiler

tion of refractory was held up with suspending alloy steel hangers, which in turn were attached to channel iron running longitudinally along each side of the boiler, under and bolted to the brackets that were welded to the boiler. These brackets also served for temporary suspension of the boiler during construction in about the same manner described for the vertical boiler.

Fire Tube Boiler

The third case was a two pass, fire tube boiler with a refractory lined firebox instead of water legs. A 20-year old industrial oil burner proved just equal to carrying this 80 hp boiler at normal rating, but could develop no overload capacity. In addition, refractory maintenance was high.

In converting the setting of the two pass boiler, the objectives were about the same as in the case of the vertical. Again there was but little boiler surface exposed to the fire, so that little radiant heat could be absorbed. This fact, coupled with confined space, quickly burned out the fire brick lining of the original firebox. To relieve this condition, the firebox dimensions were increased in three directions—making the new box higher, wider, and longer.

Again, as with the vertical, a dutch oven extension was constructed with a sloping flat arch to reflect the heat away from the arch into the open space of the combustion chamber. The original concrete foundation rose flush to the original fire brick walls, so that there was no alternative but to remove the original foundation completely. To do so required that temporary steel cribbing take the full weight of the boiler, which was accomplished by using a horizontal channel butted against the steel shell of the upper boiler pass, the channel being carried on each end by a vertical H-beam.

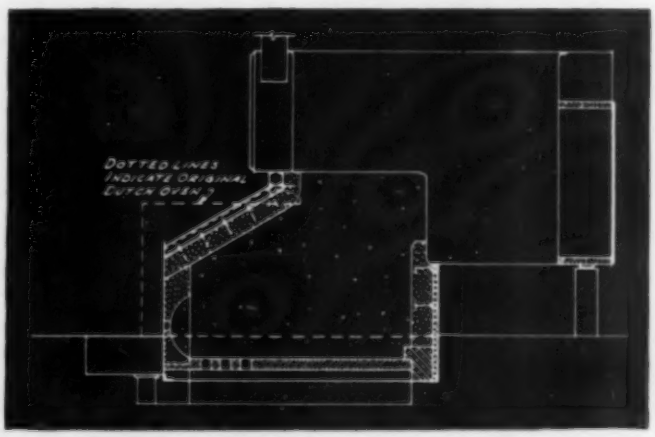
This type of boiler has a steel casing enclosing the fire brick side and rear walls, the casing being held rigid by four vertical corner angles. The original 3 x 3 in. angles were replaced with new ones allowing the side sheets of the casing to be moved 6 in. farther apart. The front sheet, originally made of heavy iron castings to support the weight of the boiler, was removed completely to make room for the sloping arch. A pair of channel irons was set up as a box to carry the weight of the boiler and to form a duct through which air could flow from the cooling lanes of the arch down into the lanes behind the side walls. The complete circuit of the cooling air, therefore, was upward over the arch, downward through the side walls, thence under the floor and up into the firebox, being distributed by ports in the firebox floor. The steel framework supporting the arch is indicated in the accompanying sketch. This arrangement permits the boiler shell above the firebox to absorb a relatively greater amount of radiant heat than with a conventional firebox.

In all three boilers the front wall and floor constructions are similar. The front of each consists of a ⅜ in. steel plate with suitable reinforcing angles containing the necessary holes to pass the burner firing cone and screws by which the burner apparatus is supported in firing position. To the inside surface of the plate were welded the hooks that engage the flexible alloy anchors which anchor the plastic refractory forming the front wall. Between the plastic and the steel, 3 in. of high temperature block insulating material is installed to reduce heat transfer to the steel plate. The floors are built up of masonry incorporating the air lanes and checkerwork for introduction of secondary air upward into the firebox.

In both water leg boilers, another similar feature was the use of alloy steel anchor hooks welded to the inside boiler walls just above the mud ring to anchor the top of the refractory walls, enabling the walls to rise above the lower rivet seams a distance of about 6 in., thereby affording ample protection to the mud ring against overheating.

The results achieved from the methods above described well justified the pains taken to alter the boiler

An 80 hp two pass boiler with refractory lined firebox showing new furnace design with sloping suspended arch. Dotted lines show original furnace design with horizontal arch which did not give maximum exposure of black surface to radiant heat of the fire. Arch and side walls are air cooled, the cooling air being discharged into the furnace as preheated air through furnace floor ports



settings. The data from the laundry where the water tube boiler is used are typical. As originally installed, this 25 hp boiler was unable to develop even its rating and still maintain the 100 psi minimum steam pressure that a laundry requires. After furnace alterations, an oil burner rated at 90 hp was installed, and easily developed the boiler to an output of 60 hp. The laundry was able to install additional equipment connected to the same boiler and still maintain 115 psi. The most marked feature of the change was that despite the increased output from the boiler, the fuel cost dropped to less than half of the former fuel cost. This laundry had been contemplating the purchase and installation of a new 75 hp boiler to meet its needs for steam. That investment, as well as the accompanying costs of more boiler room space and accessories, will not now be required due to the improved boiler performance resulting from improved furnace design.

MEETINGS & CONVENTIONS

ASTM Sets Meeting Dates

The American Society for Testing Materials, 1916 Race St., Philadelphia 3, has scheduled its spring meeting for February 24 to 28 at the Benjamin Franklin Hotel, Philadelphia. The annual meeting, scheduled for June 16 to 20, will be held at Chalfonte-Haddon Hall, Atlantic City.

Technical Groups to Sponsor Production Show and Conference

The Chicago Production Show, to be held March 17-19, 1947, in the exhibition hall of the Stevens hotel, will again be held in conjunction with the annual three-day conference of the 48 technical groups affiliated with the Chicago Technical Societies Council, sponsor of the show. Headquarters of the Societies Council is at 53 W. Jackson Blvd., Chicago 4.

Program Enlarged for Power Conference

Discussion sessions on metallurgy of power plants, industrial electronics and railroad power units will be added to the program of the ninth annual meeting of the Midwest Power Conference March 31, April 1 and 2 at the Palmer House hotel, Chicago.

The sessions are among the new features of the conference that also include a general session on civic responsibilities of the engineer to be sponsored by the Western Society of Engineers.

The Conference, with an anticipated attendance of approximately 2500 persons, will again be sponsored by Illinois Institute of Technology, 3300 S. Federal St., Chicago, Ill., in cooperation with nine midwestern colleges and universities and seven engineering societies. S. E. Winston, dean of the evening division at IIT, will serve his eighth term as director of the conference, and E. E. Whitehead, research professor at Illinois Tech, is the newly appointed secretary.

NACE Arranges Program for Conference and Exhibition

Arrangements have been completed to have Dr. Norman Hackerman, professor in the school of chemistry, University of Texas, address the members of the National Association of Corrosion Engineers, who will convene in Chicago, April 7 through 10, 1947.

Dr. Hackerman, an authority on the use of inhibitors in combating corrosion, will speak on the topic, Mechanism of Inhibitor Action, and his talk is scheduled for presentation before the general industry symposium, one of five technical sessions which will be held during the four-day conference and exhibition sponsored by NACE.

Other speakers on the symposium will be J. T. Gow, Battelle Memorial Institute, B. G. Crane, Ethyl Corp., and N. E. Berry, director of research, Servel Corp. Oxidation of Stainless Alloys, Thermogalvanic Corrosion, and Nondestructive Methods of Determining Metal Plate Thickness will be the subjects discussed by these speakers.

In addition to the five technical sessions scheduled at the Palmer House in Chicago, there will be an exhibition featuring the latest developments in material, services, equipment and devices now used in reducing corrosion. The exhibition will be open daily during the convention from 9:30 a. m. until 5:30 p. m., and will be open to the public. Association headquarters is at 905 Southern Standard Bldg., Houston 2, Tex.

Stoker Manufacturers to Meet in Tennessee

The Stokers Manufacturers Association, 307 N. Michigan Ave., Chicago 1, has selected Lookout Mountain hotel, Lookout Mountain, Tennessee, as the place for its 1947 annual meeting which will be held June 16 to 18. The next conference membership meeting of association members will be held at the Carter hotel, Cleveland, January 28.

To Hold Smoke Prevention Meeting in Canada

Arrangements have been made to hold the 40th annual meeting of the Smoke Prevention Association of America July 8 to 10, at the Royal York Hotel, Toronto, Canada. Association headquarters is at 139 N. Clark St., Chicago 2, Ill.

West Coast Chemical Show Scheduled

The first regularly scheduled Pacific Chemical Exposition, featuring an industrial chemical conference and display for the western states and Pacific area, will be presented in the Civic Auditorium in San Francisco, October 21 to 25, 1947, by the California section of the American Chemical Society whose headquarters is at the Whitcomb hotel, San Francisco 1, Calif. The manager is Marcus W. Hinson, who has handled the National Chemical Exposition for the Chicago Section since 1940.

* * *

If you are planning to attend a meeting or convention, it is suggested that you write the headquarters office of the sponsoring society or group for a copy of the program, and information about hotel reservations, etc. The street addresses of the various societies are given above for this purpose. Sometimes the dates or complete plans for such meetings are changed, and it is well, before making your own arrangements, to check with those in charge of the affair to be sure that no such changes will affect your own schedule. The editors of Heating, Piping & Air Conditioning will be glad to forward your requests for more information to the various societies, if it is more convenient for you to write direct to us.

E. C. Hach Reviews Precautions To Take in Design of Systems

14 Ways to Reduce Air Conditioning Fire Hazards

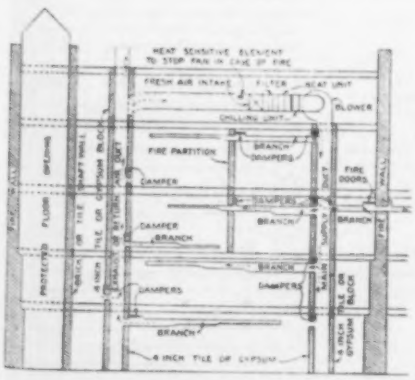
ACCORDING TO Mr. Hach, district engineer, B. F. Sturtevant Co., Div. of Westinghouse Electric Corp., Pittsburgh, the 14 safeguards in the installation and operation of air conditioning systems he lists here will reduce fire and smoke hazards so that there is practically no danger of life or property loss. He spoke on this subject at the West Virginia State Fire School last summer, and he has rewritten his material for presentation here.

FOURTEEN SAFEGUARDS in the installation and operation of air conditioning systems will reduce the hazard of fire and smoke to the point where there is practically no danger of life or property loss.

1) An effective way of preventing spread of fire and smoke throughout a building is to install one or more separate systems on each floor or in each area separated from adjacent areas by a fire wall instead of one central system serving several such areas. This is not always possible to achieve to the point of complete separation since most air conditioning systems require access to outside air and this may require the penetration of fire walls or floors.

2) All ducts should be made of noncombustible material and duct linings should be either noncombustible or treated to make them fire resistive.

Fig. 1—Typical installation of air conditioning system in building of "fireproof," "semi-fireproof," or heavy timber construction. See Figs. 2 and 3 for details of fire doors



3) Heat insulating materials, particularly if combustible, should be applied outside rather than inside.

4) Filters should preferably be of a type that will not burn freely or emit large volumes of smoke or other objectionable products of combustion when attacked by flame.

Provide Emergency Switch

5) A manually operated emergency stop switch should be provided in a convenient and accessible location, so the system may be quickly shut down in case of fire. Where the equipment is situated above the first floor, there should be a switch on the first floor in addition to one on the equipment floor.

6) Systems serving more than one floor, or more than one fire section of a single floor, should be provided with a thermostatic device with a setting not in excess of 125F on the inlet side of the air conditioning equipment, arranged to shut down the system automatically when the temperature of the air in the system becomes excessive.

7) Systems serving areas where a large number of people may gather, such as theaters and auditoriums where smoke may result in panic, or in department stores and industrial applications where smoke may cause serious loss of valuable contents, should be equipped with a smoke detecting device on the downstream side of the filters and arranged to shut down the system when smoke enters the system. Such a device should incorporate suitable visual or audible signals to indicate any condition, such as failure of the light source or photo-electric cell, which would interfere with proper operation of the device.

8) Fire dampers that will close automatically upon the melting of a fusible link should be placed at all points where a duct passes through a fire wall or fire partition. Where a duct system serves two or more floors, fire dampers should be placed at each direct outlet or inlet to the main vertical duct, and in each branch duct at its junction with the main vertical duct.

9) Outside air intakes should be situated to avoid the possibility of drawing in combustible material or smokes. They should be protected with screens of corrosion resistant material not larger than ½ in. mesh.

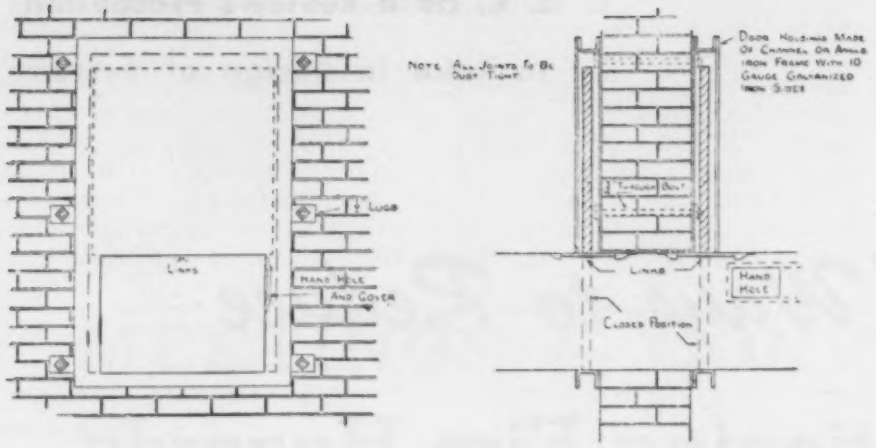

Note All Joints To Be Dust Tight
Door Housing Made Of Channel Or Angle Iron Frame With 10 Gauge Galvanized Iron Sides
Through Bolt
Lugs
Hand Hole And Cover
Closed Position

Fig. 2—Suggested type of vertical fire door for duct passing through opening in fire wall

10) Openings such as grilles less than 7 ft from the floor, particularly on the return side of the system, should be of a type having openings so small that foreign materials—such as cigarette butts, scraps of paper, etc.—cannot easily enter, or the grille should be backed up with a screen of not more than ½ in. mesh.

11) Electric wiring and equipment should be installed in accordance with the national electric code or local codes or ordinances.

12) Refrigeration equipment should be installed in accordance with the American Standard code for mechanical refrigeration, or with local codes or ordinances.

13) Cleanout openings should be provided at suitable locations in ducts to facilitate cleaning and inspection.

14) Periodic inspections of the ducts and filters should be made to prevent the accumulation of combustible materials and dust. Thermostatic protective devices and smoke detectors should be tested for proper operation at these inspection periods.

NBFU Has Standards

The National Board of Fire Underwriters' pamphlet No. 90, gives standards for the installation of air conditioning, warm air heating, air cooling, and ventilating systems, as recommended by the National Fire Protection Association. The six sketches reproduced here are from this booklet. A system installed and maintained in accordance with these standards would provide a maximum of protection against loss by fire or smoke. However, one writer on this subject—a member of a state inspection bureau—has stated that a system installed in accordance with these regulations is practically nonexistent, and that the reason for this is that the fire protection engineer has failed to educate the air conditioning design engineer to incorporate the proper fire prevention and protection features in his design. While this is undoubtedly a large contributing factor, the general opinion is that the increased cost of complying with these standards, and the lack of local ordinances requiring compliance with them, are the real reasons that more installations are not made to conform with them.

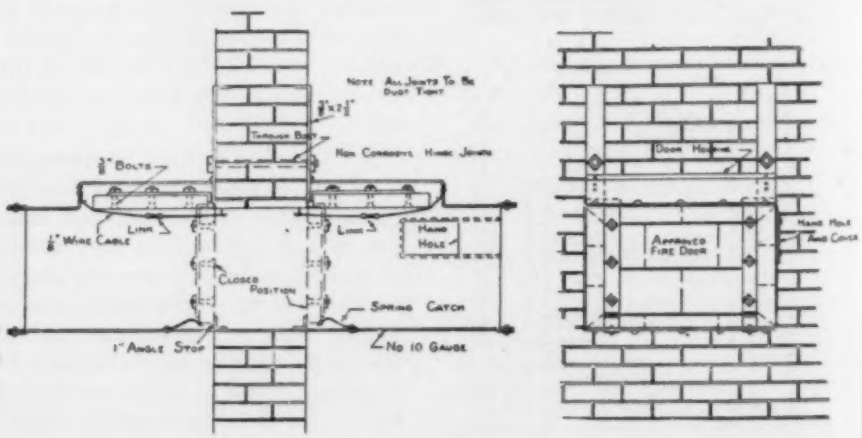
Air conditioning systems employing refrigeration may present additional hazards, depending upon the type of system and the refrigerant used. Most of the larger cities have ordinances governing the installation of refrigerating equipment, based more or less upon the American Standard safety code for mechanical refrigeration, which is sponsored by the American Society of Refrigerating Engineers and approved by the American Standards Association. A system installed in accordance with these standards will provide the maximum of safety.

The hazards of the refrigerating cycle are probably of less consequence than those inherent in the duct system, since not all air conditioning systems use refrigeration and where they do most refrigerating systems use one of the "Freon" refrigerants. Also, the duct system is the means by which a hazard may communicate with other parts of the building. A review of some of the fires that have occurred points to the need for directing attention to the duct system. The following excerpts are from an article by R. C. Loughead, chief engineer of the Michigan Inspection Bureau, in the ASHVE Journal Section, Heating, Piping & Air Conditioning, September 1939.

Causes of Some Fires

"Undoubtedly the fire which has caused the most comment was the one occurring in January of last year in the air conditioning system of a large department store. The system was located in the subbasement and conditioned this area, the basement, the first floor, and the mezzanine. On the evening of the fire, a number of em-

Fig. 3—Suggested type of automatic hinged fire door for duct passing through opening in fire wall



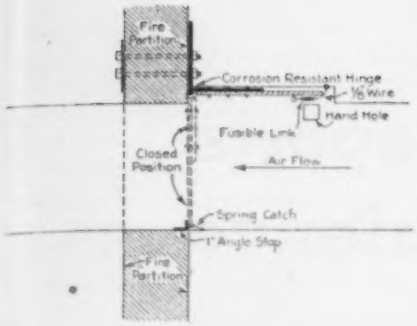


Fig. 4—Typical arrangement of automatic hinged damper

ployees were taking inventory and at the time of the fire, which occurred at 10:15 p. m., the blower fans had been shut down for over an hour. Due to an unknown cause, a fire originating in the duct system caused large quantities of smoke and some flame to be discharged into the basement and sub-basement through both outlet and inlet ducts. A total of 15 sprinklers opened, controlling the fire.

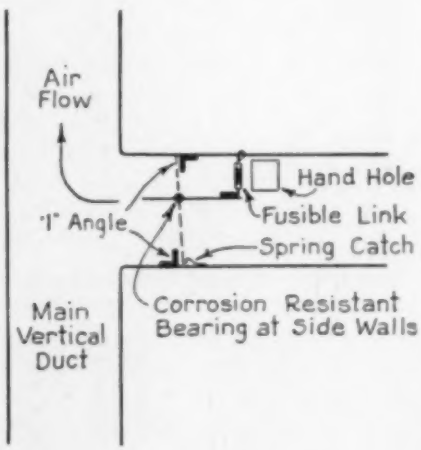
$110,000 Damage

"The damage, which was almost entirely due to smoke, amounted to about $110,000 and the fire department is reported to have taken several employees down ladders from the second story windows. This fire was evidently fed by an accumulation of waste paper scraps, lint, and other refuse in both the discharge and return ducts and might have been ignited by a cigarette being carelessly thrown into a return duct or the plenum chamber. In any event, this combustible material could not have accumulated in the duct system with properly designed intake grilles and proper air filters. Only a source of ignition was necessary to start a fire and could have been prevented had the duct system been kept clean. An examination of parts of the horizontal ducts in the discharge system and not involved in the fire showed an accumulation of oil soaked lint and dust covering as much as one-third of the duct floor to the extent of ¼ to ½ in. deep. This lint and dust had passed through the filter, and sales slips, gum wrappers, cigarette butts, and other combustible materials were found in the horizontal return ducts.

"Fire starting in a pile of kindling wood outside a school building a number of years ago entered an air intake to the ventilating system and completely destroyed the building. At a textile plant, smoke and soot from a burning tar kettle in the yard were drawn through the air intake of an air conditioning system into several manufacturing rooms on the third, fourth, and fifth stories of the building. Soot deposited on worsted yarn in process caused stoppage of plant operations and required several hours' time to clean off equipment and restore the plant to operating condition. Whether these fires were due to the improper location of the air intakes or the improper burning of rubbish or placing of a tar kettle is a controversial subject; the fact remains that had the conditioning systems in these particular buildings been properly designed, installed and maintained, there would have been no fire or smoke loss.

"Two fires occurring in widely separated localities were caused by combustible duct lining. In one, the burning of rubbish in an areaway directly under the discharge duct of the air conditioning system of a theater caused smoke, sparks, and heat to be discharged into the balcony. Fortunately there was only

Fig. 5—Typical arrangement of pivoted type automatic damper



a small audience when the fire started. The other occurred in an office building and when the janitor discovered that the air conditioning system was emitting smoke due to burning duct lining, it was necessary for him to go from the basement to the roof of this 10 story office building in order to

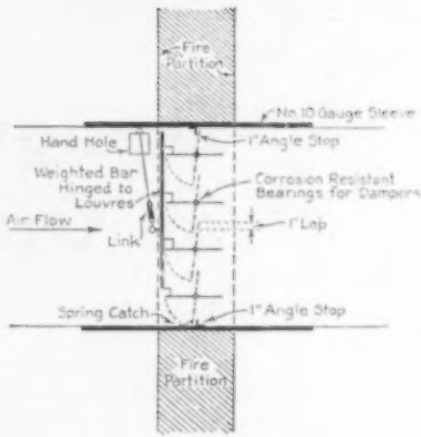


Fig. 6—Typical arrangement of louvered type automatic damper. This type may be used at an outside air intake, in fire partitions, or at the junction of a branch with a main vertical duct

shut down the fan. Proper design and reasonable foresight would have made this unnecessary.

"In March of this year, a $150,000 loss occurred to a school building which might have been minimized or entirely eliminated with proper design of both structure and air conditioning system. This school building was three stories high, of fire resistive construction except the roof, all floors and the ceiling over the third floor being reinforced concrete construction.

Proper Design Would Have Prevented Fire

"The conditioning equipment was installed in the roof space between this incombustible ceiling and the combustible roof. The discharge ducts to all the rooms were connected to a main discharge duct in this roof space, but the recirculating or foul air ducts exhausted directly into the roof space, not being directly connected to the heating system. All ducts throughout the building were of non-combustible construction except the horizontal ducts in the roof space, which were combustible. The fire, which originated in the roof space, not only was transmitted to the schoolrooms through the discharge ducts, but burning brands from the roof boards dropped through the foul air ducts into the classrooms. It is entirely possible that proper design would have prevented this fire."

Design Engineer Reports on Operating Experience

John H. Clarke, Marine Engineer
Writes of Life of a Junior Third

WITH THE WAR concluded and the immediate problem of building ships completed, it seemed an opportune time for the author to realize an old ambition to go to sea for operating experience. Having worked in marine engineering for a considerable time and just completed a siege of design work on several groups of tankers, it seemed worthwhile to find out how these ships performed in service, how they were operated, and what troubles were encountered.

It has long been the author's contention, as well as that of many other engineers, that the marine design profession has for too long lulled itself into a state of unwarranted self-satisfaction arising from lack of data and information on how their handiwork stands up in service. Instead of actively following up the woes and tribulations of the operating engineer, the designer has all too often been content—when a question comes up for discussion—to fall back on the stock answer, "Well, that's the way we did it on the last ship, and we never heard of any complaints."

Fortunately, some men in the profession have realized the need for better operating data and for histories on which to build better designs. In particular, the reports on the new high pressure, high temperature "guinea pigs"[1,2,3] and Brierley's report on wartime troubles encountered in the merchant marine[4] certainly represent splendid advances in the right direction, as well as being interesting reading for any engineer engaged in the operation of machinery or in power plant and piping design.

While men were urgently needed in the merchant marine at the time of this decision, the author was under no illusions as to the problems of a design engineer in turning to the field of operation as somewhat of a greenhorn, nor as to the unreceptive attitude of the average operating engineer about what he considers the impractical branch of the engineering family. But even then, the transition was quite a jolt.

With utter abandon, an assignment was accepted on one of a group of tankers which have earned a rather unsavory reputation among operating engineers. The fact that this fully loaded ship had been held up for three weeks awaiting a crew should have been the tipoff. The subsequent experience on this ship did nothing to improve the reputation for the class.

In all fairness it should be explained that this design was a compromise, an expedient, and a "wartime baby" spoiled by too much handling and the desire to pack too much power in too little space. Using the same hull, the power plant was increased from 6600 hp to 10,000 hp and then—to make matters worse—it was decided that an additional machinery bulkhead was needed to increase the damage floodability. This, plus a change in the engineering organization handling the design and the need for ordering material and equipment in a hurry from anyone who could supply it resulted in a nightmare as far as the machinery spaces were concerned. Some material and equipment was ill-suited for the job but, mostly, it was the crowding and resultant poor arrangement of piping and equipment that rendered good servicing and maintenance difficult if not impossible. As a result these ships had not attracted the better crews, and seldom was a crew more than temporary. Maintenance by the crews had been at the minimum, and this ship in particular was well "down the hill."

The author reported to the ship armed with a junior engineer's certi-

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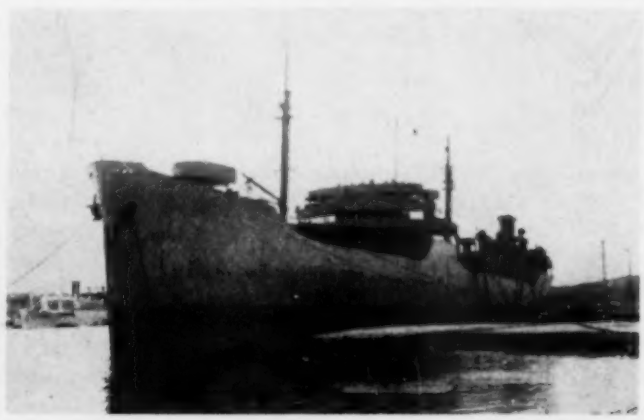

[1]A 1200-Pound Reheat Marine Installation by Benjamin Fox and Richard H. Tingey, Transactions, Society of Naval Architects and Marine Engineers, Vol. 49, 1941 pp. 356-397.

[2]Report on 1200-Pound Reheat Marine Installation of SS "Examiner," by Benjamin Fox and Richard H. Tingey, Transactions, Society of Naval Architects and Marine Engineers, Vol. 50, 1942, pp. 379-387.

[3]The Ore Carrier SS "Venore," by Harold F. Robinson and Eugene P. Worthen, Transactions, Society of Naval Architects and Marine Engineers, Vol. 53, 1945, pp. 186-248.

[4]Experience with Merchant Ship Propulsion Machinery in War, by Daniel S. Brierley, Transactions, Society of Naval Architects and Marine Engineers, Vol. 53, 1945, pp. 70-109.

ficate and an assignment as third engineer on waiver. Waivers for such jobs at that time were about as uncommon as sand on the beach but despite this, the reception committee —consisting of the port engineer, the chief engineer, and a portion of the staff—put on a performance that could have eliminated the need for refrigeration in the cold boxes for several weeks. That the ship had been held up for lack of a crew, and that they themselves were leaving the ship, did nothing to temper their attitudes. The inquisition that followed will long be remembered as a masterpiece of applying heat and cold at one and the same time. But at least they gave the author a chance to prove his worth, and that is all anyone can ask.

A third assistant engineer had already been signed on, so that left the job of junior third assistant open (these ships carry two third assistants, one called the junior third), and this was gratefully accepted.

It was understood that the chief had a consuming disdain for clean work clothes, so that situation was corrected by an immediate and thorough check of the piping in the engine room spaces—above and below the floor plates. (Sometimes it seems that the imprint of the floor plating done in oils on the nether end is more convincing than a whole stack of deeds duly done.) On the bright side, it should be mentioned that the third assistant and one of the oilers, who had been in the business for about 40 years, were most friendly and helpful. Both stayed on the ship until it got to its destination. Neither of these two men were technically trained, but they had had good experience, had good common sense, and a fine spirit of cooperation. The new first and second engineers who came aboard just prior to sailing were also patient, friendly, and helpful—and all of them certainly made a weird nightmare far more endurable than it otherwise would have been.

"Fugitive from the Boneyard"

To say that this ship was a fugitive from the boneyard would be a gross understatement of fact. Slowly but surely it was "coming apart at the hinges." In the 13 days before sailing, emergencies were a dime a dozen.

Our principal troubles evolved around the turbine driven main feed pumps, the main feed pump governor, the boiler feed regulators, and the simplex auxiliary feed pump. We were having bearing and lubrication trouble with the starboard main feed pump, and while the port main feed pump was the workhorse, the gland

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WE PUBLISHED in 1943 a series of three articles by Mr. Clarke on heating and ventilating merchant ships, as well as a fourth article he prepared in collaboration with Marvin Gardner on standardized equipment. A design engineer by training and profession, Mr. Clarke since then shipped on a tanker as junior third assistant engineer to get direct, first-hand experience on how designs perform in service, how the equipment is actually operated, and what troubles are encountered. . . . The experience he got was — to say the least — illuminating, and he reports on some of it here. . . . His seagoing phase completed, he is now a design engineer with Standard Oil Co. of Indiana.

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on its turbine throttle valve was blowing steam severely. For some reason known only to the first engineer, he refused to do anything about repacking this gland.[3] This was unfortunate, as will be seen later.

In one day and within several hours we were forced in emergencies to change feed pumps five times. We were attempting to use the starboard pump. We would just get it on and then something would happen. One time a gland bolt broke on the port pump stuffing box, and when discovered, the gland was cherry red from rubbing. Following that, a gasket blew out on the starboard pump suction, causing another change-over. In between, we had bearing trouble and oil leakage from one of the pump bearing housings.

During the trouble with the main feed pumps, we had at one time attempted to use the reciprocating auxiliary feed pump. This had been used for low pressure transfer and had been jump stroking in a manner which indicated that either the suction valve was defective or it was gone. This had been reported to the port engineer for repair, but he couldn't be interested—that is, until we tried to use it for boiler feed. After the piston showed evidence of wanting to ascend to the roof garden, he got something done promptly. An examination of the pump disclosed that one of the suction valve seat rings had broken off at the point where it entered the valve chest body. This ring had been either shrunk or pressed in under unusually high stress, which probably contributed to the breakage. In attempting to jack out the remainder of the ring, the workmen bent a steel block 1½ in. square and about 3 in. long, without moving the ring. It was later removed and replaced and the pump put back in service before sailing time.

To add to the confusion, the steam governor valve for the main feed pumps would stick in open or closed positions upon occasion and there would be a wild scramble to fix or bypass the valve before the boiler feed got out of control. This problem was probably aggravated by the watertenders (who had a bad habit of not watching the water level too closely, and then screwing down or backing off too rapidly on the adjustment to the governor valve in an attempt to restore the proper level.) The boiler feed water regulators were either sluggish or didn't work at all, and were apt to lapse into inactivity without a moment's notice. Despite repeated repair of the governor valve by a nearby yard it still remained defective and undependable. Nothing was done about the boiler feed regulators, so we spent much of our time on hand regulation of both the feed pumps and of the boiler feed. As these boilers were of the two drum, bent tube, high pressure, express type and because the watertenders were lazy in checking and maintaining the boiler water levels, a crisis used to develop frequently, with the water level getting out of hand.

Along about sailing time we began to get the ship ready by checking the equipment. Among other things, trouble had been encountered with the motor driven 125 hp main circulating pump, which had been trip-

[3] Supposedly the reason for his opposing the repacking of the gland was that he didn't want to take the port pump out of service while the starboard pump was in such an unreliable state, and thus take a chance on losing the plant. But after the auxiliary feed pump was repaired, it could have been put in service until the gland on the port pump turbine was repacked. He was leaving the ship, so he didn't have to worry about what happened at sea. The new chief, first, and second engineers arrived on the ship about 12 hr before sailing time.

ping out the main switchboard circuit breaker when the pump was started. This was checked and twice the pump blacked out the plant. Investigation by electrical repair men revealed that the trouble lay in a rather minor defect; the time delay dashpot on the main circuit breaker was low on oil, causing it to trip out improperly. This was corrected, the pump started, and the rest of the machinery readied for operation.

We Start Off With a Bang!

The turbines on these ships had three stages of extraction (nominally 70 and 30 psi gage and 8 psi absolute). The first stage provided feed heating and standby steam for oil heating (which was normally provided by a contaminated evaporator); the second stage provided steam to the ship's heating, the 10 psi back pressure line and the deaerating heater; and the last stage provided feed heating only. In any case, there was considerable valve leakage on the various steam lines through the main steam valves and the extraction steam crossover valves.

Because of this a considerable amount of water appeared to have accumulated, particularly in the second stage extraction line, connecting with the 10 psi back pressure line. This was very noticeable because in the cold condition the flanges on these lines were leaking water. Unfortunately nothing was done about draining these lines. So our trip started off with a bang—or a series of bangs. We had just turned around and begun to maneuver downstream when the water hammer started—promoted, of course, by the opening and closing of the extraction line check valves as the main throttle was opened and closed in the maneuvering. The water hammer in the 10 psi line was terrific and it didn't seem possible that the line would hold together. It appeared to move about an inch with every blow, and insulation particles were filling the air like a cloud. Finally—with one grand crescendo—the handwheel of the 6 in. cutout valve in the line was cracked off as cleanly as if it had been cut.

But still the lines weren't drained. We started to drain them once, but most of these drains went to the main condenser and because the vacuum dropped a bit, it was decided to shut them off again. In a short while, and as the plant settled down, the water hammer subsided. But it was a good show while it lasted. What a start for a trip! Little did we know that this was only the beginning!

We had left shortly after midnight, on a Saturday morning. That evening we really started to have trouble. True, we had had several emergency stops while going down the river. But these had only been "routine" emergencies—we were almost used to those by this time, so we developed a new and more exciting variety of trouble.

The lube oil system failed, thus tripping out the main turbo-generator. It wasn't quite as simple as that, because the author was on watch and noticed the loss of oil on the gravity tank overflow, signifying that the pump was falling behind in supply. The chief was called and the lube oil tanks immediately checked and found to be practically full. But the level had dropped sufficiently to trip out the main unit through the automatic relays. So the ship came to a stop while we attempted to find the cause of the trouble. The only thing that was determined was that the one lube oil pump wasn't pumping enough oil to keep up with the demand. The standby pump was started and seemed to pump a sufficient amount of oil, but after operating for about 10 minutes, this pump tripped out electrically, the loss in pressure tripping out the main unit and stopping the ship. Apparently the overload relay on this pump was defective because an ammeter showed that it was tripping out at normal amperage.

It was customary for the watch engineer to ring down "stop" on the engine order telegraph and then run like blazes for the source of the trouble

We kept going all that night by operating the two pumps in parallel as long as the standby pump would stay on, and then by restarting it just before the gravity tank level got down to the critical point. Anyway, this broke up the monotony for sure. In the morning a large amout of oil was discovered in the bilge. It was found to be coming from the propeller shaft main thrust bearing, out through the shaft sealing rings. The trouble? Well, these thrust bearings were of the flooded type with the oil supply and return both in the top of the housing. It was necessary to adjust the supply valve to just a mere trickle to avoid robbing the lube oil system and to avoid a build-up of pressure which would cause oil leakage. The valve had been properly set but a well meaning oiler had apparently seen the little trickle of oil, and wanted to be sure the bearing would get *enough* oil, so he had opened the supply valve wide. We reset the valve and for a time it again appeared that we could relax a bit. But it just wasn't to be—after this, we had a variety show.

First our old reliable troublemaker—the main feed pump governor valve—started acting up. After about the third time it had stuck shut, we gave up and operated the pump on the bypass valve for the remainder of the trip. One boiler feed regulator became so sluggish that the boiler was put on hand feed. The second engineer tried to fix the regulator on the second boiler but forgot to bypass it first; as a result, it closed. In the melee following, the boiler water was lost, and it was necessary to slow down the ship until we could get the water level up again. So both boilers were on hand feed.

Added to this, one of the boiler water gages (there were two on each boiler) was leaking so much that it had to be secured. The remote boiler level gages at the main control station were already inoperative and had previously been secured. This left a "blind spot" for maneuvering, it being extremely important during maneuvering to watch the boiler water level to avoid carryover when opening the throttle, and to be sure the boiler water isn't lost because of

the feed controls not following the power requirements. The main steam gage at the control station was shut off because of a serious leak in the gage line. So we didn't have that to check with either. This was only one of many gages and thermometers that were either defective, broken, or disconnected. We could have done almost as well operating blindfolded.

We Were Happy If Water Was Wet

There were so many leaking joints and valves on the ship that we were losing water all over the place. Specifically, we were losing 40 tons a day (about twice the normal amount) and this was over and above the water going to the distilled tanks from the make-up feed evaporator. Consequently, we couldn't be fussy where the water came from.

Ordinarily, the make-up water would be double distilled—we were happy if it was just wet. Some of the water we pumped into the distilled (feed storage) tank looked like sewer water, scum and all. To say that this make-up was raw would be putting it mildly. To offset this, the second engineer was frantically dumping chemicals into the boiler in wholesale quantities. This is bad business because chemical carryover on many of these ships has been responsible for gumming up valves and in several cases the governor and throttle valves have jammed and the turbines have run away, with disastrous results. In this case, it was a question as to which was the better of two evils—bad boiler water or chemical carryover.

It was in the process of making up this water loss that more trouble developed. The water was being pulled up from the double bottom tanks by the condenser vacuum and thus delivered to the condensate system. As this would have overfilled the deaerating heater, the water was being drawn off by a dump valve to the distilled tanks. Ordinarilly this would have been handled by the automatic overflow and dump valve. But this wasn't working either, so the hand bypass was being used.

This meant that we had to maintain a balance between the water taken into the system and that being drained off, or else we would lose the water in the deaerating heater. The watch engineer got a bit careless and the first thing he knew he had lost the water. We did manage to avoid losing suction on the feed pumps by using an emergency make-up line. But it was plenty close, and in the process, we had had another emergency stop. (It is worth mentioning that whenever such trouble occurred, it was customary for the watch engineer to ring down "stop" on the engine order telegraph and then run like blazes for the source of the trouble. This had the double advantage of getting it under control right away and of rallying the rest of the brethren to the cause, because when the ship stopped all the engineers came on the run. Needless to say that, while the procedure was necessary and expedient, it was a little rough on the bridge.)

[A second article will continue this story.]

Data Supports 1400 F Postweld Treatment for Preventing Graphitization

A paper presenting the results of a comprehensive series of laboratory tests supports, in general, the recommendation of the joint EEI-AEIC subcommittee on the graphitization of piping that a 1400 F postweld heat treatment be used for preventing the formation of the segregated type of graphite at arc-welded joints. Results obtained from a 16000 hr laboratory test indicate that normalizing welded joints does not entirely prevent graphitization, particularly in high aluminum material. However, normalizing after welding was found to be highly effective for low aluminum material.

This paper, Influence of Postweld Heat Treatment on Graphitization, by L. A. Rohrig and Arthur McCutchan was scheduled for presentation at the ASME annual meeting held in New York in December. It was contributed by the joint ASTM-ASME research committee on effect of temperatures on the properties of metals.

Outlines Factors Affecting the Operation of Underfeed Stokers

Recommendations for the installation, operation, and safety of single retort, underfeed stokers for bituminous coals having capacities of 1200 lb per hr or less are very briefly outlined in a four page folder published by the Stoker Manufacturers Association.

Prepared by the association's engineering and research committee for the guidance of distributors, installers, and others who may be directly interested, the paper includes recommendations in regard to such factors as setting height, furnace volume, ash storage, and accessibility.

Copies of the folder, entitled Factors Affecting Smokeless Operation of Underfeed Stokers, may be obtained from SMA headquarters, 307 N. Michigan Ave., Chicago 1, Ill. for 5 cents.

Recommends Vapor Resistant Coatings for Insulating Board

A good vapor barrier is essential to good construction in warehouse and storage applications where high humidities must be maintained. In potato storage warehouses desirable air conditions are 40 F and 90 per cent relative humidity. Similar, high humidity conditions are required to maintain the quality of apples and certain other fruits and vegetables during an extended storage period. It is readily apparent that a good vapor barrier will not only prevent any serious accumulation of moisture on or within framing members, but will also protect the interior and exterior finish materials.

In 1941 the Insulation Board Institute and the engineering experiment station of the University of Minnesota entered into a cooperative research program to investigate the occurrence of moisture condensation in buildings and means of its control. A second report, Vapor Resistant Coatings for Structural Insulation Board, which deals with severe moisture conditions as found in the foregoing applications, has recently been published. The authors, F. B. Rowley, professor of mechanical engineering, M. H. Lajoy, assistant professor of mechanical engineering and E. T. Erickson, research fellow, engineering experiment station, found a number of coatings for both plain and treated sheathing boards to be effective and economical. The recommended coatings are tabulated and the approximate material costs per 1000 sq ft of surface, based on 1942 prices, are given. It is pointed out that many of the sheathing boards currently on the market are factory coated. Of the eight treated boards tested, five required one coat of paint and three required two coats to provide a high vapor resistance. In general, the factory coating was found "to provide a reasonably good primer for the application of additional coats."

Heat Sources for the HEAT PUMP

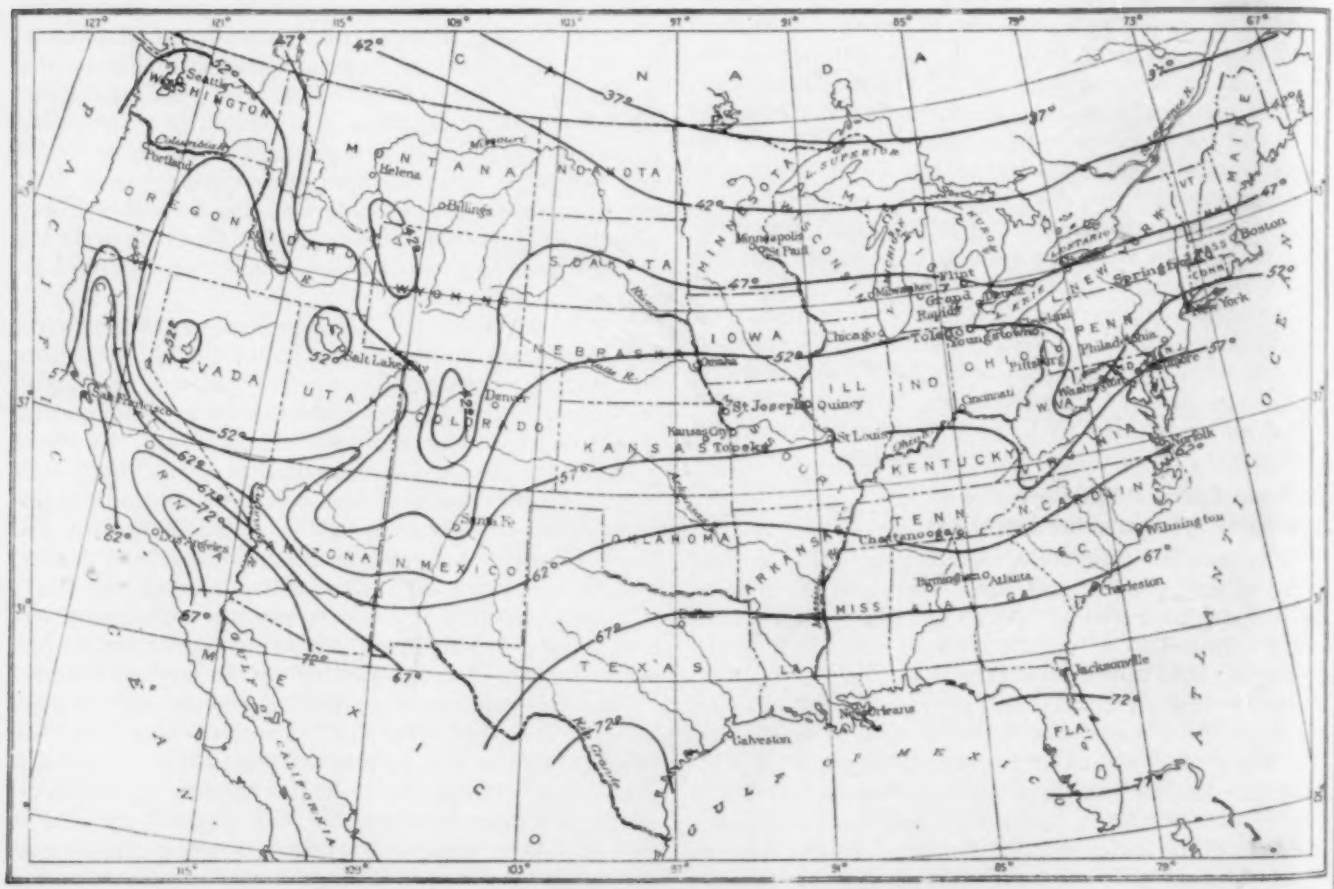
Emory N. Kemler Discusses Approximate Temperatures and Soil Conductivities

ONE OF the important factors in the selection of a heat source is the temperature at which the heat can be obtained. The following discussion will present some of the meager data available on ground and ground water temperatures.

Approximate temperatures of water from wells at depths of from 30 to 60 ft vary not more than about 1 deg, according to Collins.[18] Earth temperatures or ground water temperatures at these depths will generally exceed the mean annual air temperature by 2 or 3 deg and in some localities may exceed them slightly more than this. From this it can be seen, allowing a reasonable drop such as 5 to 10 deg between the mean earth temperature and the fluid used to pick up the heat from the earth, very efficient heat pump operation should be obtained over a considerable portion of the country. Where deeper depths are utilized, an increase in temperature of about 1 deg for each 64 ft increase in depth has been indicated by Collins.[18] On this basis, therefore, deeper wells would show somewhat higher temperatures than those shown on the accompanying map.

In the case of the pipes which are buried in the ground, the temperatures will be somewhat more varied. The seasonal variation in soil temperatures at various depths as measured in Pittsburgh in 1941,[5] in well

[18]Exponent numerals refer to bibliography.



Approximate temperature of water from nonthermal wells at depths of 30 to 60 ft. (From U. S. Geological Survey, Water Supply Paper, 520-F, by W. D. Collins)

drained red clay soil, indicates that as the depth increases, the variation decreases quite considerably. Furthermore, the minimum soil temperature at any reasonable depth, in the Pittsburgh area, will occur in March which is late in the heating season and will therefore not have as great an effect on heat pump operation as would otherwise occur. Ground temperatures have been measured in Amarillo, Tex., and at Laramie, Wyo. at 3, 6, and 10 ft depths.[19] Here again, the same general trend was found, namely, that the minimum temperature is not reached until relatively late in the heating season, and that as the depth increases, the variation in underground temperatures decreases quite rapidly. For any normal depth to which pipes may be buried the temperatures will fluctuate and will be dependent to some extent on the corresponding atmospheric temperatures, although there will be quite an appreciable lag as depth increases.

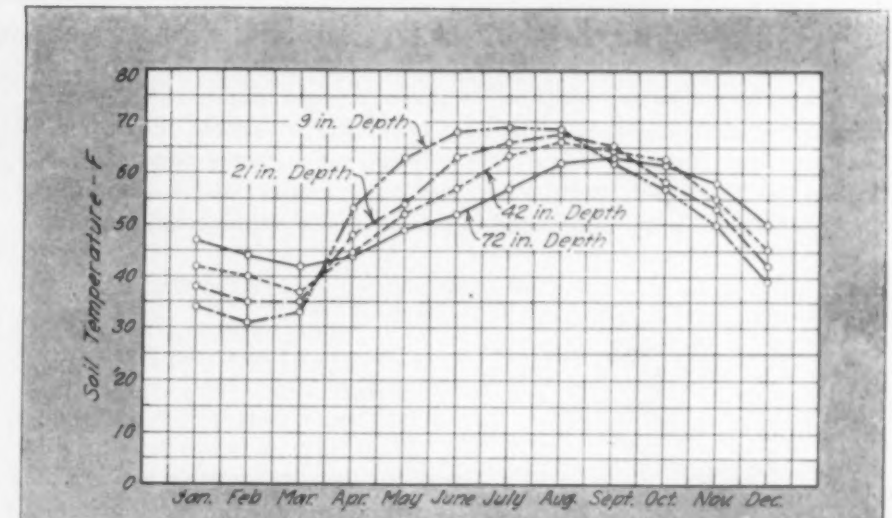
Air temperatures and corresponding ground surface temperatures were also taken at Amarillo, Tex.,[19] and it was found that ground surface temperatures are much higher than atmospheric temperatures when the sun is shining on it. Where climatic conditions permit, it is possible that pipes very near the surface might be utilized to advantage to absorb part of the radiant energy otherwise absorbed by the ground.

Of interest also are the temperature data which show the effect of heat loss from a building on ground temperatures.[5] As was previously pointed out, this condition permits the recovery of a limited amount of higher temperature heat if it should prove economical.

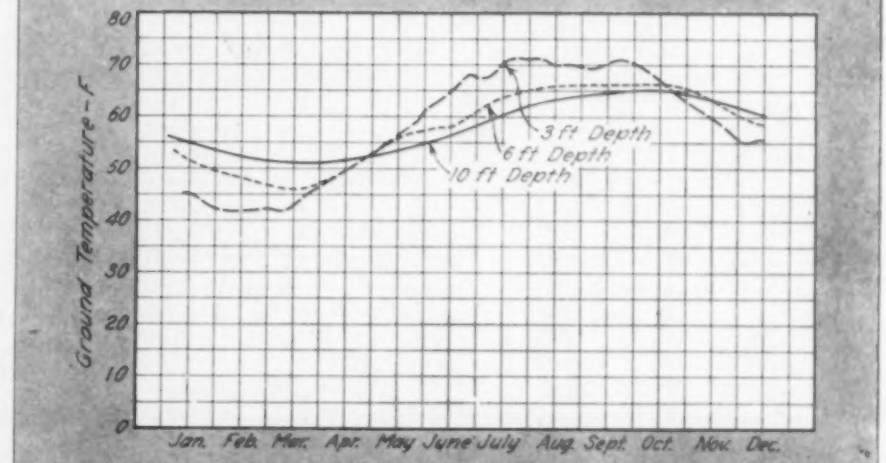
Thermal Conductivity of Ground

The information on transfer of heat through soils is very meager and no mention is made in the literature on the usage of the soil as a source of heat or as a place to dissipate heat. The most important factor insofar as heat transfer is concerned is the moisture content of the soil. Since there are no very pertinent discussions in the literature on the subject, the following comments are included to give the general background.

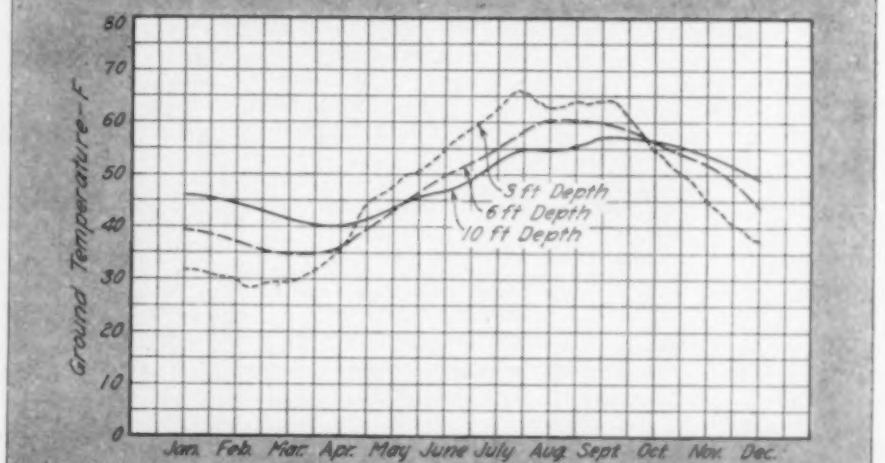
McAdams points out that in four solids heat is transferred by conduction and by convection and radiation in the air spaces.[11] Smith states that in moist soil heat is transferred by



Seasonal variations in soil temperatures at various depths as measured in Pittsburgh in 1941 in well drained red clay soil



Ground temperatures as measured in Amarillo, Texas, at 3, 6, and 10 ft depths



Ground temperatures as measured in Laramie, Wyo., at 3, 6, and 10 ft depths

IN CONSIDERING ground and ground water as sources of heat for reverse cycle refrigeration, temperatures and soil conductivities are important factors. The rather meager data available are cited in this second of two articles on heat sources. Mr. Kemler also outlines additional studies and laboratory work which he considers necessary to permit the rational design of heat sources. This article is based on a survey conducted by the Southern Research Institute and sponsored by the Southeastern Electric Exchange. The author is head of the institute's engineering research.

conduction and vapor movement.[15] Some investigators have tried to relate thermal conductivity to physical properties in materials. Data, as given by Nelson, show a general relation between density and conductivity.[12] Moisture appears to be the most important single factor in thermal conductivity of soils. Johnson states that the conductivity of wet soils is not related to the density.[6] For dry soils, the conductivity increases with the density. Svenson gives data on thermal conductivity of concrete roofs as being increased 200 to 300 per cent by moisture.[16]

The table (facing page) lists values found in the literature for conductivity of soils and related materials. This table shows that considerable data are available but are not entirely consistent. Discrepancies of several hundred per cent are indicated. These are undoubtedly due to methods by which the data were obtained and possibly by failure to define the conditions.

Nelson, in discussing the application of thermal conductivity data on soils for use in oil pipeline design, indicates that the values will probably be less than 0.4 Btu per deg F per sq ft. Karge states that the conditions and the character of the soil rather than the flow conditions in the buried pipelines carrying hot oil control the heat loss.[8] He recommends values of K of 0.5-0.6 for well drained clay soils, K=1.0 for partly submerged sandy soils, and K=0.7-0.75 for mixed soils and for bare lines in California along the coast where heavy rains occur. Inland, K of 0.5-0.6 would be more nearly correct, where the annual rainfall of only 6 in. is encountered.

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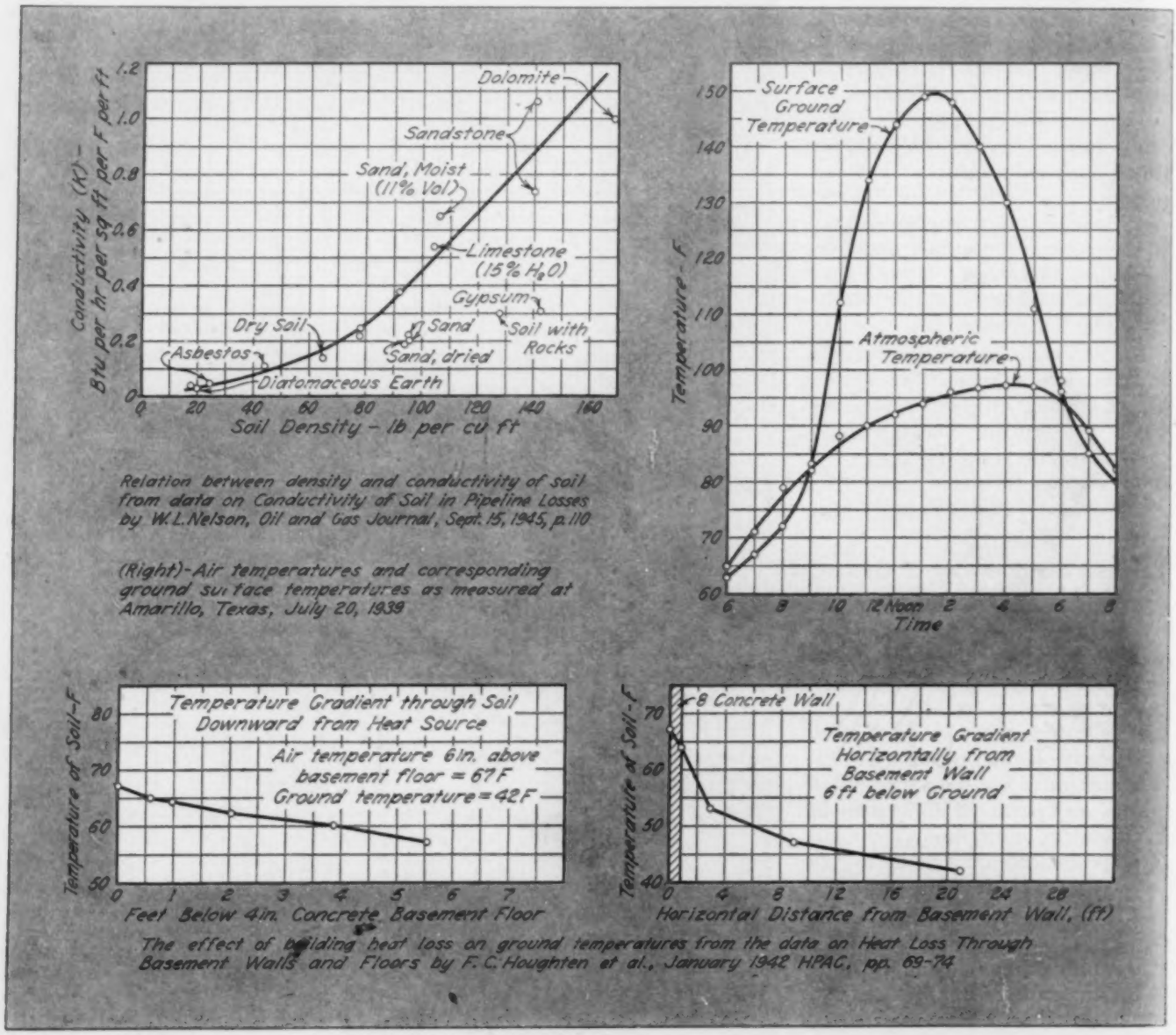
Conductivity (K) - Btu per hr per sq ft per F per ft
Soil Density - lb per cu ft
Dolomite
Sandstone
Sand, Moist (11% Vol)
Limestone (15% H2O)
Gypsum
Dry Soil
Sand
Soil with Rocks
Asbestos
Sand, dried
Diatomaceous Earth
Surface Ground Temperature
Atmospheric Temperature
Temperature - F
Time
Temperature Gradient through Soil Downward from Heat Source
Air temperature 6 in. above basement floor = 67 F
Ground temperature = 42 F
Temperature of Soil - F
Feet Below 4 in. Concrete Basement Floor
8 Concrete Wall
Temperature Gradient Horizontally from Basement Wall 6 ft below Ground
Horizontal Distance from Basement Wall, (ft)

Relation between density and conductivity of soil from data on Conductivity of Soil in Pipeline Losses by W. L. Nelson, Oil and Gas Journal, Sept. 15, 1945, p. 110

(Right)-Air temperatures and corresponding ground surface temperatures as measured at Amarillo, Texas, July 20, 1939

The effect of building heat loss on ground temperatures from the data on Heat Loss Through Basement Walls and Floors by F. C. Houghten et al., January 1942 HPAC, pp. 69-74

WHAT WE NEED TO KNOW ABOUT HEAT TRANSFER AND HEAT SOURCES

A review of the general information which is available indicates that studies on many points need to be carried out in order to permit the rational design of heat sources for heat pump installations.

Item No. 1 to be listed in any general program is an analytical study of the heat transfer to long pipes when buried in the ground. This study should be undertaken to determine analytically those factors which it is expected will have the most important effect on the transfer of heat from the ground to a liquid in a pipe and to estimate their relative effects. This is of particular importance in designing the later experimental programs in that it will emphasize those conditions which should receive first consideration and also permit preliminary estimates as to relative amounts of heats which can be transferred under varying conditions.

Item No. 2 in this program is a further laboratory study particularly concerned with the details of the heat transfer problem. It is proposed to undertake laboratory studies, utilizing the electrical analogue, of certain problems such as temperature distribution around buried pipes, the study of effect of closeness of tube spacing, the relative effects of distance below the ground, and the relative effects of ground surface temperatures at various distances below the ground on the general performance of such equipment. The utilizing of the electrical analogue should, as in the first case, give general information as to what can be expected under maximum and minimum conditions. This permits a more intelligent planning of the experimental program for the obtaining of the maximum amount of information. The utilization of laboratory studies such as these is much more economical and gives more general information than the corresponding long term experimental programs as listed under Item No. 4.

Item No. 3. Simultaneously with the above study, some laboratory experimental work would be carried out to determine the conduction characteristics of soils under various conditions. Under these conditions, an experimental set-up would be made whereby the conductivity of various types of soils under various moisture conditions could be studied in order to set up limits which might be utilized in the laboratory studies. Once these preliminary investigations are under way, it would be possible to properly design the experimental program as set up under Item No. 4.

It may be desirable to run a series of tests in various types of soils utilizing short lengths of pipe to determine spot values of the conductivity of the earth at various depths and under various soil and moisture conditions. Such tests would be made of only a few days duration and would not give all the information required. It would, however, permit an overall study of a large number of soil types and conditions with a minimum amount of equipment and work.

Item No. 4 in this proposed program is a year-round experimental study of a piping system handling heat quantities comparable to those which would be handled under the maximum load conditions. In this program, it is proposed that an extensive experimental set-up would be installed requiring the disposition of an amount of heat equivalent to the conditions under which an actual heat pump installation would operate. Such a study would cover both buried pipes and a well in order to obtain data to be used in evaluating these two means of getting heat from the earth.

Thermal Conductivities of Soil and Related Materials

Material	Density lb / cu ft	K Btu/hr/sq ft/F/ft	Ref.
Soil, very light and dry		0.21	9
" clay	65.7	0.14	6
" "	78.0	0.26	6
" "	96.0	0.38	6
" "		0.8	3
" dry		0.08	10
" "		0.08	14
" "		0.083	9
Soil, norm. cond., excavated—including stones 1-3 in., 68 F	127.0	0.30	10
" minimum moisture		0.85	9
" mixed, heavy rainfall		0.73	
" wet, max.		2.62	9
" wet		0.39	10
" moist		0.83	9
" wet		0.39	14
Clay soil, dry		0.50	8
" " moist		0.90	8
" " moist to wet		1.50	8
" " red clay, well drained, Pittsburgh		0.57	5
" " well drained, California		0.55	
" " sand damp		0.91	9
Clay sub soil, wet		1.34	9
Sandy soil, clay or sandy, damp		0.91	9
" " dry		0.65 0.45	8
" " moist		1.10	8
" " soaked		2.40	8
" " moist to wet		1.20	8
River sand, fine, dried, 68 F	95.0	0.19	10
" " normal moisture (11 per cent)	102.4	0.65	10
Sand, dry		0.224	3
" "		0.19	9
" moist		0.67	9
Earth's crust		0.97	9
Sawdust		0.03	14
Diatomaceous earth		0.03	14
Granite, limestone, sandstone, etc.		1.25	14
Water		0.3–0.54	14
Air		0.012	14
Air 150 F		0.017	11

SUMMARY

Soil, dry	66.0	0.1–0.3
" average moist		0.3–0.5
" soaked		0.5–1.5
Clay soil, dry		0.5
" " moist		0.6–0.9
" " wet to soaked		1.0–1.5
Sandy soil, dry	95.0	0.2–0.65
" " moist	102.0	0.65–1.2
" " wet to soaked		1.2–2.4

verse Cycle for Heating, Conditioning, Heating, Piping & Air Conditioning, August 1946.

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Says Terminal Velocity Method of Measuring Dust Particles is Most Useful

Very often the behavior of fine dust particles in the air or in other fluids and the ease with which they can be separated from an air stream are expressed in terms of particle diameters in microns. This is based on the assumption that the particles are spherical and of uniform density. Most industrial dusts, however, are a mixture of particles of irregular shapes and varying densities. R. B. Foley, supervisor of dust collector research, American Blower Corp., says that the terminal velocity of a dust particle is a measure of the combined effect of size, shape, and density and provides the most useful data for the majority of engineering problems involving dusts or powders.

In a paper, Terminal Velocity as the Measurement of Dust Particle Characteristics, which was presented at the semi-annual meeting of the ASME last June, Mr. Foley cites a good deal of the literature on the subject, briefly mentions the methods of measuring dust characteristics which are commonly used, and points out their shortcomings and limitations. For example, the simplest and best known method of size analysis is by screening, but the smallest standard sieve has 400 meshes per inches and many materials such as pulverized fuel fly ash will pass through this sieve. Microscopic examination is time consuming and laborious and the difficulties in dispersing a typical sample within a small field, and then determining the average linear dimension of an irregular shaped particle, make this method impractical for many applications. A fact that is far more important to the author is that while the size of particles, particularly in the subsieve range, is of great importance in the field of industrial hygiene, it is only one of the factors which are important to the engineer who must control dust particles. The behavior of particles in the air or some other fluid is also dependent on shape and weight.

In the author's opinion, the two methods used most frequently for analyzing dust and granular materials which are the most practical, are the sedimentation and the elutriation methods. Each of these involves the determination of the terminal velocity which is defined as the ultimate velocity which a particle will attain when falling through a given quiescent fluid. After mentioning a number of the more common methods and types of apparatus used in making these terminal velocity determinations, the author discusses the common practice of expressing the results obtained from sedimentation and elutriation analyses in terms of particle diameter in microns. The transition from terminal velocity to particle size is based on Stoke's law and it is necessary to assume that all particles are spheres and of uniform density.

It is stated that "the results from a large number of analyses made of various types of dusts with the Roller air elutriator show very little deviation from straight lines, within the range of 5 to 300 in. per min, when the terminal velocity is plotted against cumulative per cent by weight on the log-probability form." It is also stated that an examination of photomicrographs of samples of various materials, obtained by fractionations at terminal velocities between 79 and 81 in. per min, disclose differences in sizes in spite of the fact that the materials tested were of approximately the same specific gravity. In addition, he compares the equation for terminal velocity with that for centrifugal settling velocity and states that in all types of centrifugal fly ash or dust collectors it is the terminal velocity rather than the size of the particle which determines its separation efficiency.

This paper which advocates the use of terminal velocity in inches per minute as a standard unit of measure in the analysis of fine dusts has been reprinted by the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y., and is identified as paper No. 46-SA-24.

Semi-Lateral Tank Ventilation Hood Controls Contamination, Cuts Costs

By William P. Battista, Industrial Hygiene Laboratory, Metropolitan Life Insurance Co.

WHERE OPERATIONAL methods permit, a properly designed semi-lateral hood can frequently be employed to advantage in the ventilation of bench work as well as open processing tanks. Herewith is described a hood of this type which has been successfully used, particularly under mechanized conditions, to lower operational and maintenance costs as well as to control more effectively high rates of contaminant dispersion, such as steam and vapors from heated solutions.... So called "push-pull" ventilation has much to recommend its use on open tanks if it is carefully installed and properly maintained. It is particularly suitable for the control of wide tanks and for multiple tank installations wherein exhaust provisions alone would create excessive room air heat losses, objectionable drafts, and a room air replenishing problem. The author reports the results of a test of "push-pull" in a typical processing tank room and the design factors used to create adequate contaminant control despite the unusually low rates of air movement required with the method.

INDUSTRIAL PROCESSES that require the control of atmospheric contaminants in order to maintain satisfactory working conditions include metal cleaning, plating, anti-corrosion treatment, and other open tank operations. Removal of these contaminants by means of exhaust ventilation necessitates the handling of relatively large volumes of room air, and the consequent power consumption and heat loss can assume serious proportions when several such tank operations are involved. Therefore, efficiency and economy of operation assume special significance and due care should be used in the design of the ventilation system particularly with regard to the characteristics of the hoods or suction openings.

This article gives the design of a hood* that embodies features making it particularly useful for the control of open tank dispersions, as well as the ventilation of other operations conducted on benches and flat surfaces. Information is also presented describing the method by which exhaust air rates can be greatly reduced through the use of relatively low volumes of air blown across the working area under pressure.

Exhaust Hood Design

It is customary in the control of tank dispersions to use high velocity, exhaust through relatively narrow slots in manifolds or ducts installed on one or more sides of the tank. This affords the operator freedom of movement on both sides of the tank, and—if this is a rigid requirement—no practical substitute for the slotted manifold seems possible. However, the limitations involved in the installations of well designed manifolds and ductwork may result in high initial and maintenance costs. Moreover, the rates of contaminant dispersion, particularly in the case of steam, are frequently too high to permit adequate collection with reasonable rates of exhaust air flow. The latter consideration assumes added significance since large quantities of steam are evolved from hot water rinse, hot and electrolytic alkali and stripping tanks, which are usually to be found in the average plating room and which are responsible for creating undesirable high room humidities as well as air contamination.

The use of overhead or canopy type hoods is precluded when tank units are mechanized and overhead conveyors and monorail systems form a part of operational equipment. In any case, overhead hoods are undesirable inasmuch as the operator's breathing zone may sometimes be in the path of contaminated air flow with their use.

In most instances the operator need have access to only one side of a processing tank and where tanks are aligned for a sequence of operations his activities are normally confined to one side of the group. Therefore, it is frequently possible to install hoods of improved air flow characteristics in a vertical position at the opposite tank sides and, in many cases, to permit such hoods to extend a limited distance over the tank surfaces in order to further increase control.

An Effective Hood

A hood that has proved highly effective for such installations is shown in Fig. 1. Its advantages over the conventional slots at the tank edges include simpler design, lower entrance loss, decreased initial and maintenance costs, and improved uniformity of air flow over the entire surface of the tank. Actually the hood embodies nothing more than the familiar "fish-tail" with control baffles forming an integral part. This design provides for an inclined open face through which moderately high velocities are maintained in a semi-lateral direction away from the operator's breathing zones.

*Original design by the Colonial Blower Co., Hartford, Conn.

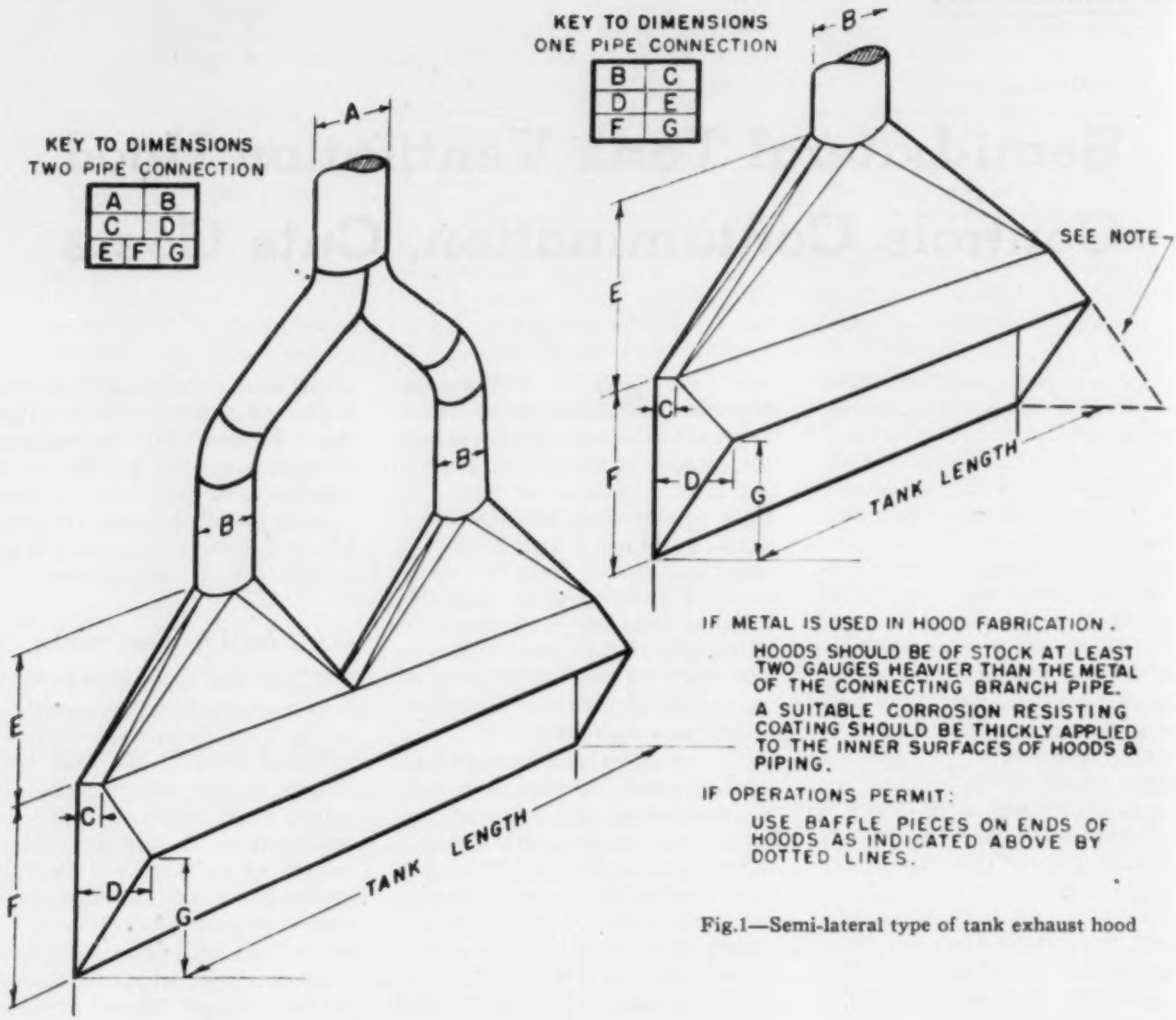


Fig.1—Semi-lateral type of tank exhaust hood

Fig. 1 shows the hood with single and double exhaust connections. The hood length for a single connection should be limited to approximately 4 ft in order to keep the "fish-tail" height within reasonable limits and still maintain uniformity of flow throughout its length.

Hood dimensions shown in Table 1 have been based upon 150 cfm per sq ft of tank surface area† producing a velocity of approximately 1800 fpm through the hood throat and 2500-2700 fpm through the exhaust pipe connections. Tests have shown that under these conditions the hood loss in terms of velocity pressure in the connecting branch pipe is in the neighborhood of ¾ v.p. On the average, system resistances with hood and pipe velocities as indicated above, will range from 1 to 1¾ in. water gage. Table 2 provides a quick reference for aid in selection of the necessary exhaust fan. The figures shown are the product of tank length, width, and 150. To illustrate the use of Tables 1 and 2 specified hood dimensions and air quantities for two tanks, one 4 ft long by 30 in. wide and one 6 ft long by 42 in. wide, have been blocked in.

In problems wherein operating conditions prevent hood overhang (distance *D* in Fig. 1), as when dip baskets of large dimensions relative to the size of tank surface area are used, the hood may be modified in design and mounted at the rear edge as shown in Fig. 2. This will result in some loss of control but not sufficiently to offset the merits of the basic hood design. Dimensions indicated are referred to Table 1 for the tank sizes under consideration.

Values of *G* in the table were chosen to meet average conditions of operation. Factors concerned are the frequency of tank use, the speed of material or basket withdrawal from the tank, and the rate of steam or other contaminant dispersion. If these factors are increased, particularly the speed at which work is withdrawn, some increase in the magnitude of *G* may be indicated in order to raise the zone of influence of the hood.

"Push-Pull" Design Cuts Heating Load

As pointed out above, the removal of room air at the rate of 150 cfm for each square foot of exposed surface

†This rate of exhaust has been selected as the average minimum necessary for all tanks of surface widths normally encountered. It is based upon practical field experience and may be safely used in the majority of problems where ventilation is to be accomplished by exhaust alone. It has been common practice to use a rate of 100 cfm or less per sq ft of tank surface but too often local cross drafts tend to reduce control to below tolerable limits.

Table 1 — Hood dimensions in inches referred to in keys of Fig. 1

TANK LENGTH-IN FEET	TANK WIDTH-IN FEET: 1.5	2	2.5	3	3.5
	ONE PIPE CONNECTION				
3	7 1.5 / 5.5 18 / 9 7	8 2 / 6.5 18 / 12 9	9 2.5 / 9 18 / 16 12	10 3 / 11.5 18 / 20 15	10.5 3.5 / 13.5 18 / 24 18
3.5	7.5 1.5 / 5.5 21 / 9 7	8.5 2 / 6.5 21 / 12 9	9.5 2.5 / 9 21 / 16 12	10.5 3 / 11.5 21 / 20 15	11.5 3.5 / 13.5 21 / 24 18
4	8 1.5 / 5.5 24 / 9 7	9.5 2 / 6.5 24 / 12 9	10.5 2.5 / 9 24 / 16 12	11.5 3 / 11.5 24 / 20 15	12 3.5 / 13.5 24 / 24 18
	TWO PIPE CONNECTION				
4.5	8.5 6 / 1.5 5.5 / 14 9 7	10 7 / 2 6.5 / 14 12 9	11 8 / 2.5 9 / 14 16 12	12 8.5 / 3 11.5 / 14 20 15	13 9 / 3.5 13.5 / 14 24 18
5	9 6.5 / 1.5 5.5 / 15 9 7	10.5 7.5 / 2 6.5 / 15 12 9	11.5 8.5 / 2.5 9 / 15 16 12	12.5 9 / 3 11.5 / 15 20 15	13.5 9.5 / 3.5 13.5 / 15 24 18
5.5	9.5 6.5 / 1.5 5.5 / 17 9 7	11 7.5 / 2 6.5 / 17 12 9	12 8.5 / 2.5 9 / 17 16 12	13 9.5 / 3 11.5 / 17 20 15	14 10 / 3.5 13.5 / 17 24 18
6	10 7 / 1.5 5.5 / 18 9 7	11.5 8 / 2 6.5 / 18 12 9	12.5 9 / 2.5 9 / 18 16 12	14 10 / 3 11.5 / 18 20 15	15 10.5 / 3.5 13.5 / 18 24 18
6.5	10 7 / 1.5 5.5 / 20 9 7	11.5 8.5 / 2 6.5 / 20 12 9	13 9.5 / 2.5 9 / 20 16 12	14.5 10 / 3 11.5 / 20 20 15	15.5 11 / 3.5 13.5 / 20 24 18
7	10.5 7.5 / 1.5 5.5 / 21 9 7	12 8.5 / 2 6.5 / 21 12 9	13.5 9.5 / 2.5 9 / 21 16 12	15 10.5 / 3 11.5 / 21 20 15	16 11.5 / 3.5 13.5 / 21 24 18
7.5	11 8 / 1.5 5.5 / 23 9 7	12.5 9 / 2 6.5 / 23 12 9	14 10 / 2.5 9 / 23 16 12	15.5 11 / 3 11.5 / 23 20 15	16.5 12 / 3.5 13.5 / 23 24 18
8	11.5 8 / 1.5 5.5 / 24 9 7	13 9.5 / 2 6.5 / 24 12 9	14.5 10.5 / 2.5 9 / 24 16 12	16 11.5 / 3 11.5 / 24 20 15	17.5 12 / 3.5 13.5 / 24 24 18

area of tank may require the use of relatively large air handling equipment and result in high room air heat loss. Inasmuch as it is ordinarily impracticable to sufficiently filter or clean any part of the exhaust air for recirculation, this heat loss may impose a prohibitive load on the existing heating plant, as any plant engineer familiar with the problem can testify. Therefore, any changes in the control measures that will permit reduction of the quantities of air handled without loss of control should be carefully considered.

In this connection, the author has had occasion to review the merits of several so-called "push-pull" tank ventilation designs wherein provision is made for positive air streams to be directed across the tank toward the exhaust opening. The confinement and control of atmospheric contaminants in this fashion is by no means new, and sufficient investigation has already been made to demonstrate the soundness of this design principle illustrated in Fig. 3. Several tank ventilation installations of proved value with the use of "push-pull" have been reported.

An instance of its application with particularly satisfying results makes use of the semi-lateral type hood** in conjunction with unusually low volumes of directed supply air. In this case, the directed supply air was obtained from the previously existing air line main from the plant compressor. This source of supply was selected in place of a separate blower inasmuch as experimentation conclusively showed that the rates of air flow required for satisfactory control with applied exhaust are small enough to impose no serious addition to the normal load of plant-size compressors. This is true even when air from this source is simultaneously supplied to a number of tanks.

Using Compressed Air Supply

The use of existing compressed air lines materially reduces air flow installation costs and basic requirements are simply a ½ in. ID perforated metal pipe of tank length, connecting piping which can be standard heavy duty rubber tubing and a needle valve for controlling pressures.

The blowpipe shown in position in Fig. 3 is perforated by a series of 1/16 in. diameter holes in line on the tank side. These holes are spaced 1½ in. on centers and are drilled at a slight angle below the horizontal plane through the pipe centerline. The needle valve is mounted at the supply end of this pipe within easy reach of the operator. Pressure control can be improved by the installation of a pressure reducer at the point of tap into the compressed air main, adjusted for the maximum pressure which will be required in the blowpipe under changing intensities of adverse drafts and fluctuations in the rate of con-

**The hood is of design as described above but with modifications to suit considerably lowered exhaust rate requirements due to the presence of the directed supply air. When air rates are other than 150 cfm per sq ft of surface area, the hood slot widths and collar diameters (dimensions *A*, *B*, and *C* in Figs. 1 and 2) should be revised to maintain specified velocities therein. Thus a reduction by half in the exhaust rate requires a similar reduction in the width of slot and cross sectional area of hood collars.

Table 2—Required tank exhaust, cfm

TANK WIDTH IN FEET	TANK LENGTH-IN FEET: 3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8
1.5	675	790	900	1015	1125	1240	1350	1460	1575	1690	1800
2	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400
2.5	1125	1315	1500	1690	1875	2060	2250	2440	2625	2810	3000
3	1350	1575	1800	2015	2250	2470	2700	2930	3150	3370	3600
3.5	1575	1840	2100	2360	2625	2880	3150	3420	3675	3930	4200

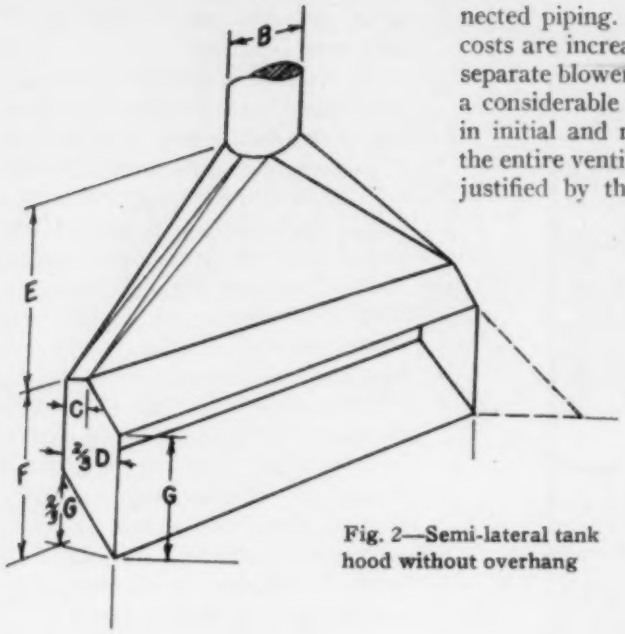


Fig. 2—Semi-lateral tank hood without overhang

nected piping. Although installation costs are increased with the use of a separate blower they are still offset to a considerable degree by the saving in initial and maintenance costs for the entire ventilation setup as well as justified by the assurance of more positive and consistent contaminant control.

In the study of a typical installation following the design described, the system performance was observed and physical factors carefully measured with steam as the contaminant undergoing control (the path of water vapor in the atmosphere is easily noted and its behavior is such that it may be used as a reliable criterion for the establishment of control factors for gases, mists, fumes, and similar contaminants encountered in industry).

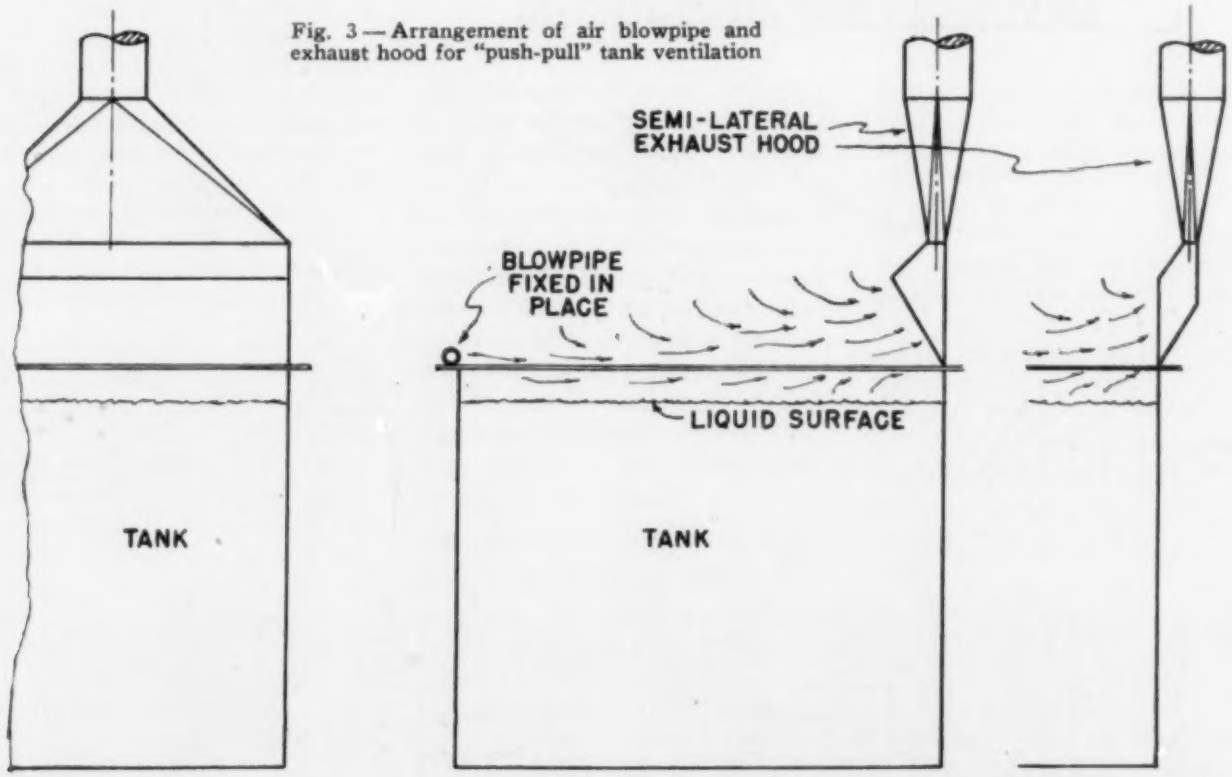
The tank used had an exposed surface area 6 ft 0 in. x 3 ft 4 in. with live steam supplied well below the surface. During the study, the rate of steam input was varied from a mere trickle to a flow sufficiently high to cause violent turbulence of the solution and exceptionally high evolution of water vapor from the entire surface. Observation was also made of the effect produced by wide variation in the degree and direction of adverse crosscurrents of the surrounding room air. The exhaust rates were maintained in the neighborhood of 75 cfm per sq ft of surface area (or about one-half the rate specified above for use with exhaust provisions alone) while the degree of compressed air pressure applied to the blowpipe was varied according to the need under the changing conditions.

It was found that under conditions of high steam dispersion, it was necessary to maintain pressures of 7½ to 11½ in. water gage in the blowpipe according to the severity of the adverse crosscurrents to which the setup was subjected. This range of pressures corresponded to air discharge rates approximating 8 to 10 cfm, according to careful jet velocity measurements and a reasonable assumption for the orifice coefficient of discharge. Similarly, for relatively low steam dispersions, blowpipe pressures as low as 3 to 4 in. water gage were sufficient in order to realize control in the presence of adverse drafts. Pressures of this order correspond to air flow rates of 5½ to 6 cfm. Practically complete entrapment and exhaust of the dispersed water vapor took place under "control" conditions

taminant dispersion. Without the reducer, economy of operation requires that the needle valve be fitted with a "stop" at maximum opening. The further addition of a "full on" and "off" valve between needle valve and blowpipe is optional.

If compressed air is not available as a source of supply, it is necessary to install a centrifugal blower of proper pressure and volume characteristics. In the selection of the blower ample allowance should be made for resistance loss in the con-

Fig. 3 — Arrangement of air blowpipe and exhaust hood for "push-pull" tank ventilation



except during the short intervals when rapid withdrawal of materials or work baskets carried a part of the contaminant outside the influence of the applied ventilation.

Required Air Blow

From these findings, it can be recommended that for tanks 3½ ft wide that are sources of heavy or rapid contaminant dispersion, the required air blow should be based on approximately 1½ cfm per ft of tank length, or the blow produced by a pressure of roughly 9½ in. in the particular blowpipe described when exhaust is taking place at the rate of 75 cfm per sq ft of surface area; for tanks of similar width but with only light dispersion the air blow should be based on approximately 1 cfm per ft of length, or a pressure of about 4 in. in the air pipe, for the same rate of exhaust.

The behavior of the system under test gave every reason to suppose equally good control would take place with little or no required increase in either blow or exhaust rates for the tanks of substantially greater width commonly used. Further, from observation of the system behavior with the exhaust fan shut down and only air blow at the rates shown above taking place, there was indication that the specified exhaust rates could be safely reduced without appreciable loss in control.

The radical departure of these findings from those reported by others indicates the need for further study of the "push-pull" design. The evident advantages of this method of control stresses the necessity for reliable minimum design factors for practical use. Further, too much emphasis cannot be placed on the need for proper design, installation, and maintenance of "push-pull" systems. Experience has shown that installed systems, particularly when using compressed air supply, are frequently improperly operated due to misdirection of the air blow and much too high pressure maintenance in the "blowpipe." Improper selection of pipe material and the consequent rapid accumulation of corrosion, particularly when plant maintenance is lacking, is also a common occurrence. These faults can so easily destroy the effectiveness of "push-pull" that it is inadvisable to employ the principle as described herein, unless proper attention will be paid to good operation and maintenance.

No Radical Changes in Oil Burners, Nos. 5 & 6 Oil, Says OHI Secretary

IT IS NOT likely that there will be any radically new designs in oil burners. There are a limited number of ways in which a liquid can be atomized and mixed with air, and all of the known ways have been tried. The present burners are fitted with the atomizers that experience has shown are the best for the purpose. It would be unsafe to say that new methods will not be discovered; we can say only that is is not likely, but we must grant that the development work in connection with the jet-propulsion airplane power plant and the gas turbine may produce fuel atomizing or fuel handling equipment that can be incorporated in oil burners.

If it were not for the matter of noise, it is probable that oil burning heating units would in the future become much smaller. As turbulence and temperature in the combustion chamber are increased, the amount of space required for the burning of oil becomes less. This would permit making the units smaller were it not for the fact that the noise increases as the combustion space is decreased. This is a particular disadvantage in apartment house heating, but is usually of little consequence in industrial plants. It is probable that a number of very small, self-contained, high capacity boiler-burner units will come along. This trend is already reflected in the numerous commercial and industrial self-contained power plants that are now on the market. One particular advantage of these units is that they are built one for the other and their characteristics made to match. This is not possible on a conversion installation where the boiler and burner are not brought together until they arrive at the site of the installation.

With regard to oil, it is not likely that there will be any great amount of change in the Nos. 5 and 6 oils usually used on commercial and industrial installations. The oil refiner now has available to him through his catalytic cracking stills, a means of producing from crude oil almost any hydrocarbon compound he cares to. Processes are known to him whereby he can produce from a barrel of crude oil more than a barrel of gasoline, and gasoline is, of course, the oil refiner's bread and butter product. Under this condition, the refiner obviously will do everything in his power to increase the consumption of gasoline and then only after he has satisfied the gasoline demand will he concern himself with supplying the much less profitable fuel oils.

There was a time when fuel oil was a byproduct of the manufacture of gasoline. This was in the days of the straight-run and thermal cracking plants which were limited in the things that they could do with a barrel of crude. With the new catalytic cracking plants, which were a wartime product necessary in the production of high octane aviation gasoline, the oil refiner is a refiner in name only; he is really a manufacturing chemist who can make rubber tires out of his barrel of crude almost as easily as he can make gasoline.

However, since it is expected that oil production will be able to meet and exceed oil consumption, as far as we can see into the future we will continue to have ample supplies of fuel oil. The refiner will naturally take care of his gasoline demand first, but there will be plenty of crude left over which he will be glad to convert to fuel oil, even though he must sell it for less money than he does his gasoline. — *from an address by G. T. Kaufman, technical secretary of the Oil-Heat Institute of America, at a meeting of the Real Estate Board of New York on December 17.*

Methods of Making

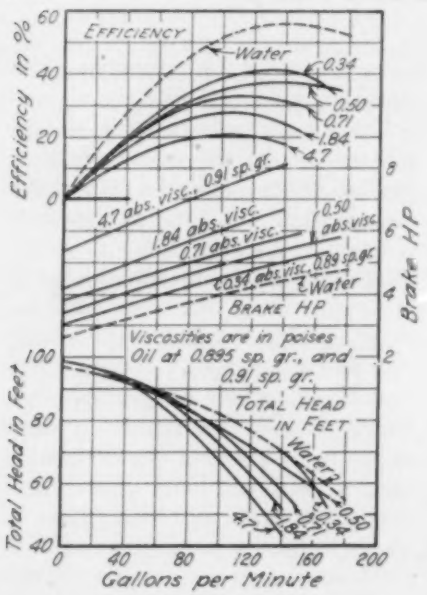
"OPEN FOR DISCUSSION"

CENTRIFUGAL PUMP FUNDAMENTALS

THE EDITOR—I have read John J. Woolfenden's article on centrifugal pump fundamentals in the October HPAC, and his method of explaining and arriving at the "pump equations" is quite unique and is well done. The entire article appears to be clear, and as complete as can be expected in an elementary treatment of the subject.

Increasing Viscosities

One thing I believe hasn't been made strong enough, however, and that is the reduction of the pump head developed when a unit handles liquids of increasing viscosities. The accompanying curves show the manner in which the head drops (and brake horsepower increases) as viscosity increases. The curves represent a 2 in. discharge, 2½ in. suction, double suction pump with constant impeller diameter operating at a constant speed.



Pump characteristic curves showing effect of increased viscosity

The method of estimating expected head drop and increased horsepower is quite involved and would be beyond the scope of the article, but I believe this matter should be clarified. —Bruce W. Ellis, chief engineer, Buffalo Pumps, Inc.

REPLY BY AUTHOR—I appreciate the interest Mr. Ellis has taken in the article on centrifugal pump fundamentals and am glad to have his comments.

An Operating Characteristic

I have always regarded the effect of pumping a viscous liquid as more of an operating characteristic than an inherent trait of the pump, since it is the result of something which is, so to speak, imposed upon the pump from outside and, in that sense, may be regarded as similar to the effect of capacity control by throttling.

It is true that the article emphasized the fact that the head developed by a centrifugal pump is independent of the specific gravity of the liquid handled. This, however, is due to the fact that, as is evidenced from the basic equation ($h = V^2/2g$), the head is a function of the velocity only, all other factors in the right hand member of the equation being constants and no expression for mass is involved. The equation, therefore, represents one of the basic principles involved in the pump design.

However, the relationship between the effect of the fundamental, or inherent, characteristics upon operating results and the effect of operating conditions upon the results due to fundamental characteristics is so intimate that I admit that I often find it somewhat difficult to draw, in my own visualization of the conditions, a definite line of demarcation.

As to the effect of the viscosity of the liquid handled upon the head developed by the pump and the brake horsepower requirement, if we consider one of the familiar viscous substances, such as molasses, it is not difficult to understand the results.

The cohesion of the particles of the liquid, at ordinary temperatures, makes it difficult to impart velocity to it—witness the expression "as slow as molasses"—and the adhesion of the fluid to the pump parts in contact with it requires the expenditure of considerable energy to effect a separation.

Both of these conditions represent a very appreciable amount of work internal to the pump, and the resulting effect of increase in the viscosity of the liquid handled upon the head, brake horsepower requirement and the pump efficiency is clearly shown by the curves furnished by Mr. Ellis which, it should be noted, are plotted for a constant pump speed.—JOHN J. WOOLFENDEN, Smith, Hinchman & Grylls, Inc., architects and engineers.

FLOOR CONSTRUCTION FOR RADIANT JOBS

John E. Peterson's article on Improved Floor Construction for Radiant Heating Systems, in the July HPAC, resulted in a number of comments by readers of it which have appeared in our "Open for Discussion" department. Among those who discussed the article is Ed. E. Scott, whose remarks were published on page 87 of the October issue. Answering Mr. Scott, Mr. Peterson has the following to say:

"It is difficult to reconcile Mr. Scott's statement that my article is unfair to radiant heating. My article was motivated by a desire expressed by a number of persons in the construction industry to improve slab floor construction because past experiences in northern areas have not been always satisfactory.

"There is no intention of direct or indirect reflection on any form of radiant heating, and this aspect was considered thoroughly before publication. The subject appeared timely because economic conditions and radiant floor heating have contributed to the increased use of slab floors in northern areas.

"When applying radiant heating in the form of a floor panel, it appears just as logical to provide for retarding the flow of heat downward as it is to insulate above a ceiling panel or the exterior walls of a structure."

WHEN ENGINEERS gather to hear a paper or talk, there comes a time when the meeting is thrown "open for discussion." We follow this custom in these columns, which provide an opportunity to comment on articles published, discuss other topics of interest to heating, piping, and air conditioning engineers and contractors

fixed end moments, carryover factors,

Methods of Making

PIPING FLEXIBILITY

Analyses

MOMENT DISTRIBUTION METHOD

By R. C. DeHart
Associate Professor, Civil Engineering
Montana State College

THERE ARE numerous methods of analyzing the flexibility of piping systems and a great amount of material on this important subject has been published. In the June HPAC, Sabin, Crocker and Arthur McCutchan reviewed the various methods, and suggested that the advocates of the different schemes each briefly outline the merits of his method and show the solution of two problems; in this way, the reader can judge for himself the suitability of the different calculation procedures in his own piping work.... S. W. Spielvogel followed this suggestion in the July issue, explaining the essentials of the elastic center method, and in September M. J. Fish discussed the graphical method. In November, W. G. Hooper covered the tabular integration method and solved the two problems given by Messrs. Crocker and McCutchan by that means. This month, Professor DeHart explains the determination by moment distribution of the reactions and the moments arising from the expansion of piping systems

THE APPLICATION of moment distribution to the calculation of moments and reactions set up in piping systems subjected to temperature change has the following points of advantage:

1) It is not necessary to set up and solve simultaneous equations, regardless of the degree of indeterminancy.

2) In many instances the determination of initial fixed end moments is sufficient to indicate that the layout of the system is — or is not — satisfactory.

3) Additional boundary conditions, such as a third anchor point, do not appreciably complicate the solution.

4) The action of the structure is at all times apparent to the person making the analysis.

5) The moments at all joints in the structure are determined by the moment distribution procedure.

Two Weaknesses in Method

There are two obvious weaknesses in the method:

1) Including the effect of curved pipe complicates the problem considerably; however, the predetermination of the elastic properties for the systems commonly encountered — such as those involving the use of welding ells with a radius of curvature equal to 1½ times the nominal pipe diameter — simplifies the solution immensely. It is impractical to develop elastic properties for all radius bends that might be used.

2) The method is not applicable to routine calculations — with the exception that once carryover factors, distribution factors, and fixed end moments are found it requires no special knowledge to complete the solution using only a slide rule.

Elastic Properties of Single Plane Piping System

The elastic properties of a 10 in. pipe size, single plane system involving bends with a radius of curvature of 1½ pipe diameters are given in Figs. 2, 3, 4, 5, 6, 7, and 8. Only the properties of this system are given here since it is the only one involved in the solution of the example to be presented. The effect of additional flexibility due to flattening, and consequently rotation of the cross section at the bends, is included[1].

Information required to determine

[1]Ueber die Formaenderung duennwandiger Rohre, by Thomas Karman, Zeit. VDI, Vol. 55, 1911, p. 1889.

587 lb. This thrust would produce

fixed end moments, carryover factors, shear balance factors[2], and moment distribution factors can be obtained from these figures. In a piping system of constant moment of inertia and constant modulus of elasticity in which the effect of curved sections is neglected, the values of the moments and shears and, therefore, the reactions, are directly proportional to the modulus of elasticity and moment of inertia.

A simple relation like the above does not exist if the curved sections are included, since a change in moment of inertia alters the flexibility of the curved section and therefore changes the elastic properties of the system in other than a linear fashion. If the various parts of the structure have different moments of inertia or are at different temperatures, the effect of this must be included in the determination of fixed end moments, carryover factors, etc.

Application of Moment Distribution

The application of moment distribution using shear balance factors to the system given in Fig. 1 is outlined below. A positive moment indicates that the joint tends to rotate the member clockwise and a negative moment indicates that the joint tends to rotate the member counterclockwise. From Figs. 2, 3, 4, 5, 6, and 7 the following properties of member *BC* are obtained. The quantities are corrected for a modulus of elasticity of 25×10^6 and are computed using unity for the moment of inertia. A modulus of elasticity of 30×10^6 was used to develop the curves.

Moment produced by unit Δy with zero Δx = 525 in.-lb.

X reaction due to unit Δy with zero Δx = 97.5 lb.

X reaction due to unit Δx with zero Δy = 3890 lb.

Moment produced by unit Δx with zero Δy = 42200 in.-lb.

Moment required to produce unit rotation with zero Δx and Δy = 583,000 in.-lb.

Allowing no joint rotation, the deflection of 6.03 in. goes to *BC*, producing a moment of $6.03 \times 525 =$ 3170 in.-lb and is negative.

The thrust in *BC* in the *X* direction resulting from a deflection of 6.03 in. in the *Y* direction is $6.03 \times 97.5 =$

[2]See discussion of paper Moment Distribution Analysis for Three Dimensional Pipe Structures, by R. C. DeHart, Journal of Applied Mechanics, ASME Transactions, September 1945, p. A-188.

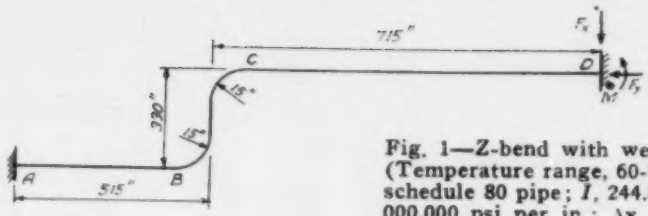


Fig. 1—Z-bend with welding elbows (Temperature range, 60-725 F; 10 in., schedule 80 pipe; *I*, 244.8 in.⁴; *E*, 25,000,000 psi per in.; Δx, 1.62 in.; Δy, 6.03 in.)

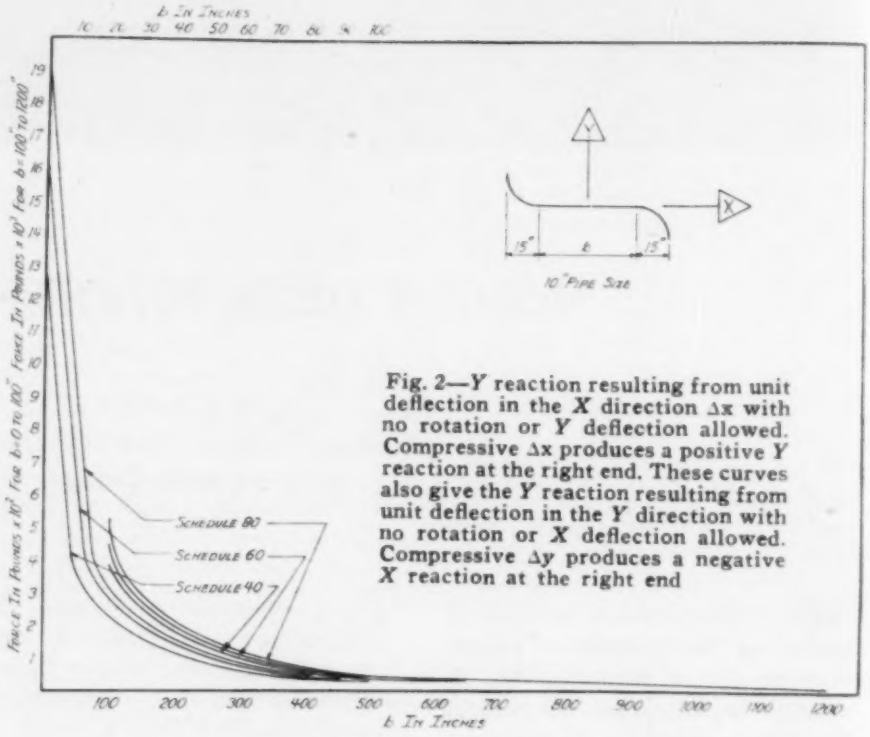


Fig. 2—*Y* reaction resulting from unit deflection in the *X* direction Δx with no rotation or *Y* deflection allowed. Compressive Δx produces a positive *Y* reaction at the right end. These curves also give the *Y* reaction resulting from unit deflection in the *Y* direction with no rotation or *X* deflection allowed. Compressive Δy produces a negative *X* reaction at the right end

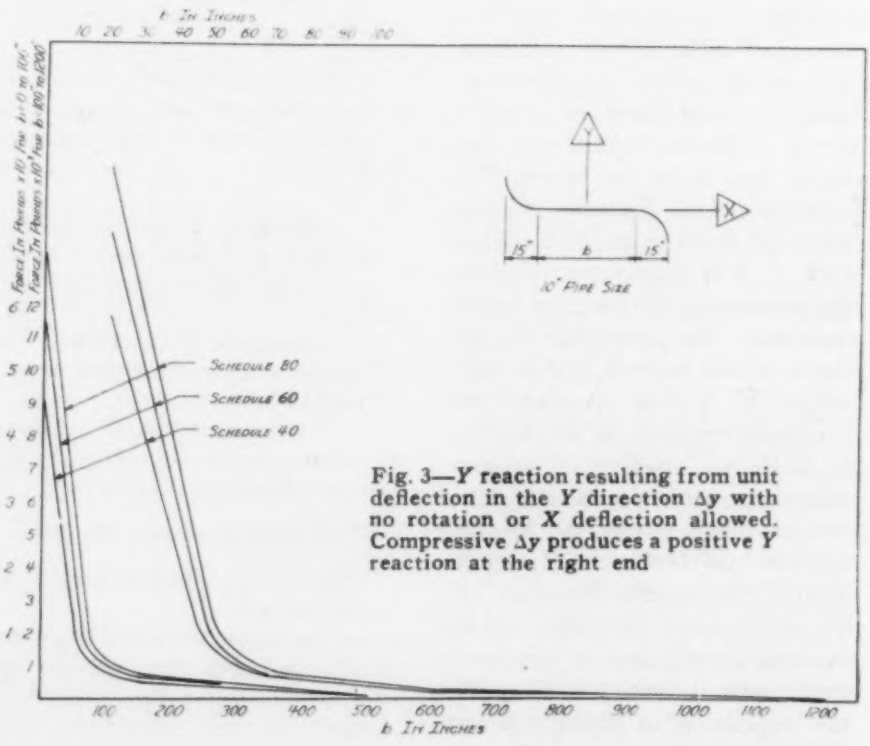


Fig. 3—*Y* reaction resulting from unit deflection in the *Y* direction Δy with no rotation or *X* deflection allowed. Compressive Δy produces a positive *Y* reaction at the right end

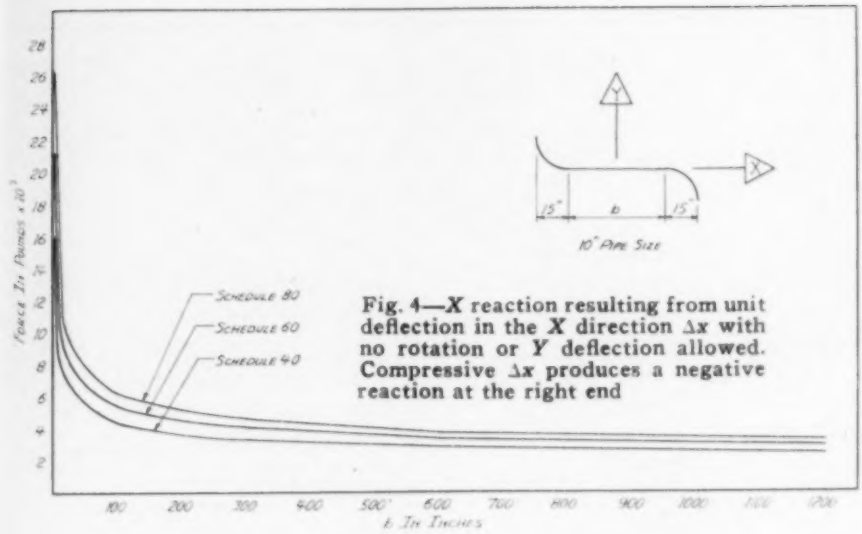


Fig. 4—*X* reaction resulting from unit deflection in the *X* direction Δx with no rotation or *Y* deflection allowed. Compressive Δx produces a negative reaction at the right end

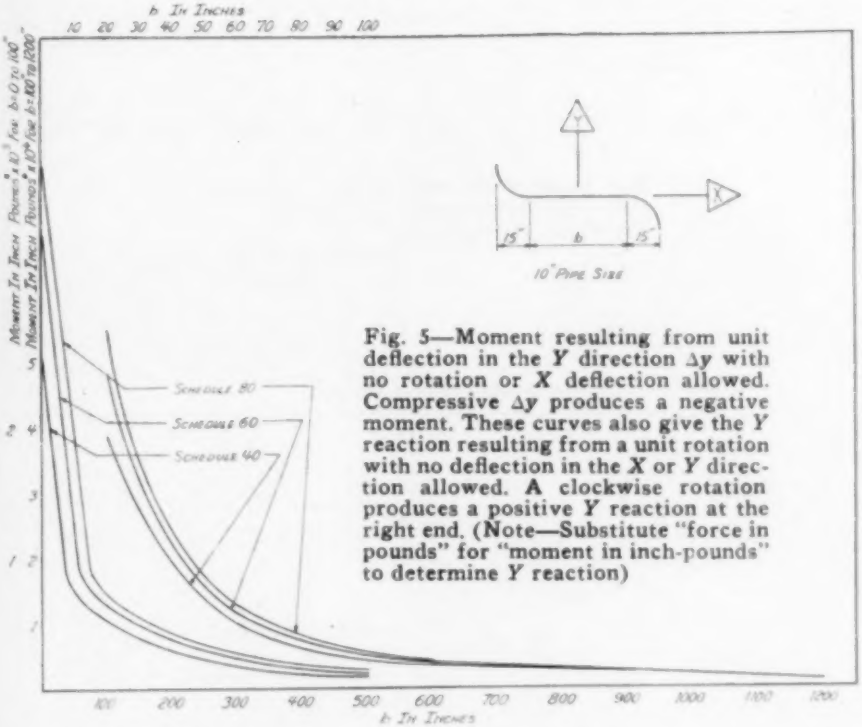


Fig. 5—Moment resulting from unit deflection in the *Y* direction Δy with no rotation or *X* deflection allowed. Compressive Δy produces a negative moment. These curves also give the *Y* reaction resulting from a unit rotation with no deflection in the *X* or *Y* direction allowed. A clockwise rotation produces a positive *Y* reaction at the right end. (Note—Substitute "force in pounds" for "moment in inch-pounds" to determine *Y* reaction)

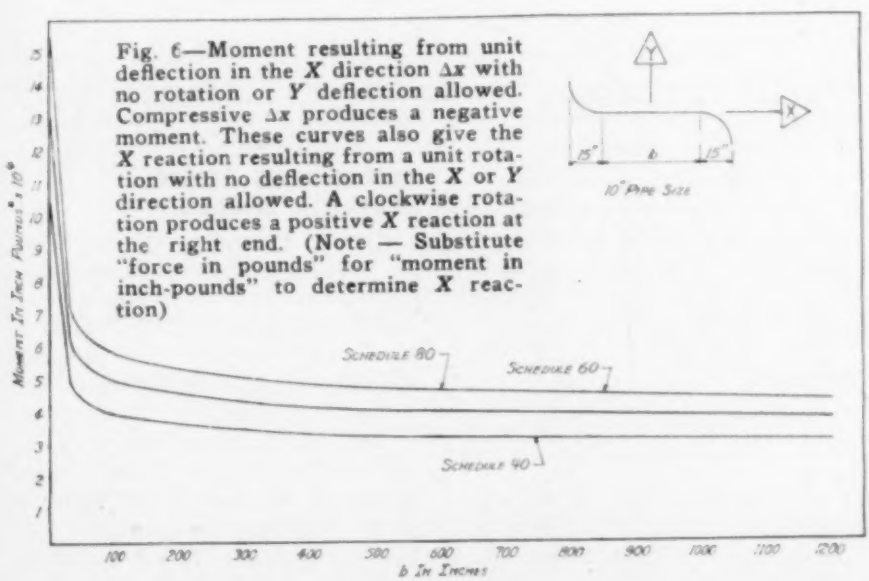


Fig. 6—Moment resulting from unit deflection in the *X* direction Δx with no rotation or *Y* deflection allowed. Compressive Δx produces a negative moment. These curves also give the *X* reaction resulting from a unit rotation with no deflection in the *X* or *Y* direction allowed. A clockwise rotation produces a positive *X* reaction at the right end. (Note — Substitute "force in pounds" for "moment in inch-pounds" to determine *X* reaction)

587 lb. This thrust would produce a compressive Δx in BC of

$$\frac{587}{3890} = 0.15 \text{ in.}$$

In order to balance shears, this thrust must be eliminated by allowing joints B and C to translate with no rotation.

With the ends of AB fixed against rotation, a deflection of

$$\frac{L^3}{12EI} = \frac{500^3}{300{,}000{,}000}$$

$= 0.417$ in. results from a unit shear.

For CD, unit shear produces a deflection of 1.14 in. and for BC

$$\frac{1}{3890} = 0.00026 \text{ in.}$$

In the above computations, the moment of inertia I is taken as unity and the modulus of elasticity E as 25×10^6.

This gives 0.04 in. deflection in AB, 0.11 in. deflection in CD, and a tensile deflection of 0.15 in. in BC.

Moment in BC resulting from a 0.15 in. tensile deflection in the X direction is

$$\frac{587}{3890} \times 42{,}200$$

$= 6370$ in.-lb positive moment.

Total fixed end moment in BC $= +6370 - 3170 = +3200$ in.-lb.

Again allowing no joint rotation, the deflection of 1.62 in. will divide between AB and BC in direct proportion to the cube of their lengths, since —as before determined—BC is so stiff that its deflection will be negligible.

Fixed end deflection in AB $= 0.44$ in.

Total deflection in $AB = 0.44 + 0.04 = 0.48$ in.

Fixed end deflection in $CD = 1.18$ in.

Total deflection in $CD = 1.18 + 0.11 = 1.29$ in.

Fixed end moment in AB with I taken as unity $=$

$$\frac{6E\Delta}{L^2} = \frac{150{,}000{,}000 \times 0.48}{500^2}$$

$= 288$ in.-lb.

Likewise, fixed end moment in CD $= 395$ in.-lb.

Determination of Shear Balance Factors

Unit moment change in BC produces an unbalanced shear of

$$\frac{1}{584{,}000} \times 15 \times 3890 - \frac{1}{584{,}000} \times 165 \times 97.5 = 0.0725 \text{ lb.}$$

An X deflection in BC of

$$\frac{0.0725}{3890} = 0.0000186 \text{ in.}$$

corresponds to this shear, As previously determined, this entire deflection divides between AB and CD resulting in 0.0000186 in. deflection in BC.

Shear balance factor for BC = $0.0000186 \times 42{,}200 = 0.79$.

Shear balance factors for AB and CD are less than 0.01 and will be neglected.

Shear balance factors for AB

$$500 \times \frac{0.75}{500} \times 0.73 = 0.54 \text{ for } AB$$

$$700 \times \frac{0.75}{500} \times 0.27 = 0.28 \text{ for } CD$$

Shear balance factor for BC will be less than 0.01 and will be neglected.

$$700 \times \frac{0.75}{700} \times 0.27 = 0.20 \text{ for } CD$$

$$500 \times \frac{0.75}{700} \times 0.73 = 0.39 \text{ for } AB$$

Shear balance factor for BC will be less than 0.01 and will be neglected.

Moment Distribution and Carryover Factors

Moment distribution factors are based on the moment required to produce unit end rotation. The carryover factor for BC is +0.84 as determined from Fig. 8. The carryover factors for AB and CD are +0.5.

The distribution of fixed end moments is carried out in Fig. 9. From the final moments at A, B, C, and D the reactions are obtained:

$$F_x = \frac{1912 + 1320}{700} \times 244.8 = 1130 \text{ lb}$$

$$F_y = \frac{1130 \times 1230 - (671 + 1320)\,244.8}{330} = 2730 \text{ lb}$$

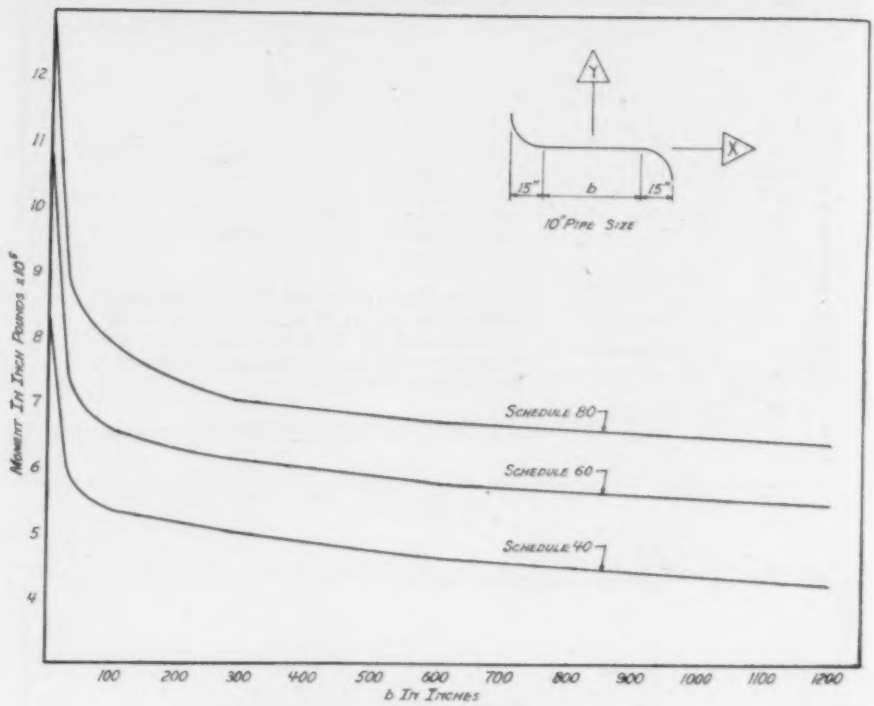
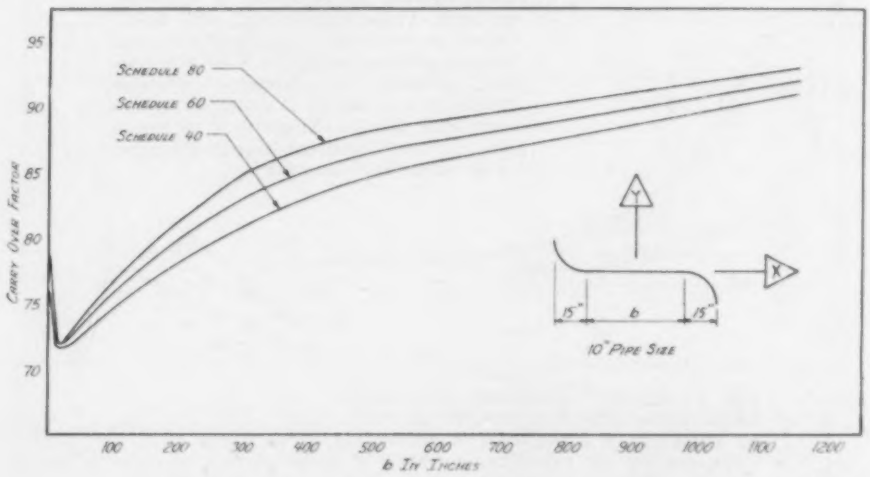


Fig. 7—Moment required to produce unit end rotation with no deflection in the *X* or *Y* direction allowed.

Fig. 8—Carryover factors



The distribution in the example has been carried out more than is necessary. Suppose the procedure is stopped at the fifth balance at both B and C from which the following moments are obtained:

A = 696 in.-lb
B = 1614 in.-lb
C = 1817 in.-lb
D = 1256 in.-lb

It will be noted that all of these moments are within 10 per cent of those determined by the longer distribution.

TREMENDOUS BOILER, RADIATOR BACKLOG

Reports indicating expansion of the research, educational, and promotional activities of the Institute of Boiler and Radiator Manufacturers on a broad front were received at the annual meeting of the members and associate members in Atlantic City.

Carrol M. Baumgardner, executive vice president of the United States Radiator Corp., was elected chairman of the institute, succeeding A. E. Bastedo, president of the Burnham Boiler Corp.

A	B		C.O.	C		D
	AB 26 AB -54 CD +28	BC 74 BC -79	+0.84	BC 80 BC -79	CD 20 CD -20 AB +39	
-288 -378	-288 -757	+3200 -2155		+3200 -1810	-395	-395
+408	+408	+1710 -1680		+1710 -1995	-212 -498	-212 -249
-194 -236	-194 -472	+1570 -1342		+1570 -1130	+100	+100
+254	+254	+1060 -990		+1060 -1174	-132 -294	-132 -147
-115 -148	-115 -296	+930 -843		+930 -710	+59	+59
+160	+160	+666 -580		+666 -690	-83 -172	-83 -86
-67 -94	-67 -188	+545 -536		+545 -450	+34	+34
+101	+101	+423 -335		+423 -399	-53 -100	-53 -50
-39 -60	-39 -121	+315 -344		+315 -289	+20	+20
+65	+65	+272 -190		+272 -227	-34 -57	-34 -28
-22 -39	-22 -79	+179 -225		+179 -189	+11	+11
+43	+43	+178 -106		+178 -126	-22 -31	-22 -15
-12 -26	-12 -53	+100 -150		+100 -129	+6	+6
+29	+29	+119 -55		+119 -65	-15 -16	-15 -8
-6 -18	-6 -36	+51 -102		+51 -86	+3	+3
+19	+19	+80 -25		+80 -30	-10 -8	-10 -4
-3 -12	-3 -25	+24 -70		+24 -59	+2	+2
+13	+13	+55 -10		+55 -12	-7 -3	-7 -1
-1 -8	-1 -17	+9 -49		+9 -41	+1	+1
+9	+9	+39 -2		+39 -2	-5 -1	-5
		+2		+2		
-6	-13	-35		-2		
-671	-1703	+1703		+1912	-1912	-1320

Fig. 9—Moment distribution

H. S. Washburn, chairman of the board, H. B. Smith Co., was elected vice chairman of the institute, and R. E. Ferry was re-elected treasurer.

L. N. Hunter, chairman of the boiler technical committee, reported on the deletion of the requirement for fusible plugs in low pressure heating boilers in the Massachusetts rules; on a change in the ASME code affecting water relief valves; on the proposed commercial standard for testing and rating of hot water supply boilers; on gas fired ratings for convertible boilers; on IBR ratings for large boilers; and on the proposed extension of the IBR ratings to smokeless boilers.

Mr. Hunter, who is vice president of the National Radiator Co., recommended on behalf of the committee that "where there are no radical changes in smokeless boilers, the hand fired ratings for similar boilers may be approved for the smokeless type."

In a review of business conditions, a majority of the members of the institute expressed the opinion that boiler and radiator manufacturers may look forward to several years of active demand for their products. The tremendous backlog of building requirements not only in the residential field but also in large buildings for industrial, commercial, and institutional uses was cited as one reason for optimism. Several members and associate members are expanding their plant facilities and others are improving their plants and working conditions by mechanization of foundry and other processes.

COAL REGULATIONS PROVE REFRIGERATION ESSENTIAL

Regulations issued during and just after the coal strike by the government and coal burning utilities were cited by leaders in the refrigeration industry as "added evidence of the essential character of the services performed by refrigeration equipment."

Industry spokesmen pointed out that the coal strike restrictions gave top priorities to the generation of electricity to operate refrigeration equipment used in the production, distribution, and storage of food products of all kinds. Even in the initial restriction, which curtailed the use of air conditioning for comfort, it was shown that air conditioning for industrial processes and for health and safety were exempt from the coal conservation measures announced by the CPA.

RECORD-BREAKING '47 CONSTRUCTION SEEN

Record-breaking construction activity during 1947 was forecast last month by Department of Commerce officials, who predicted almost $22 billion of building of all kinds. The Associated General Contractors of America, seeing a $20 billion figure, estimated that $15 billion would be for new construction and $5 billion would be maintenance and repair work.

The estimates exceed greatly the 1942 peak created by the construction of war plants and military installations.

QUESTION OF THE MONTH

Figuring Heat Losses For Two Drying Kilns

SEVERAL MONTHS ago, "H. W." submitted a question for publication on the heat required for two dry kilns, which he supplemented with some additional data, as follows:

A plant making veneer crates and hampers for the fruit and vegetable trade has two dry kilns each 7 x 22 x 120 ft. Eight thousand wet crates are put through these per day. Each crate carries about 8 lb of water. Banks of steam coils at one end with powerful exhaust fans at the other furnish the present drying medium. No one knows the capacity of the fans, but they are extremely powerful.

With the exception of the wire stitching department, this plant is shut down on Saturday. Because of this, they have to dry material during the week for this day's run. This adds to the cost and gives poorer work. These cannot lay wet because of mildew.

This firm is interested in getting some auxiliary heat to enable them to operate the kilns on Saturday.

The walls of these kilns are of regular 7/8 lumber. The crates are processed at the rate of 8000 every 10 hr. The crates are piled onto cars which are moved ahead by hand as dry material is removed and wet added. The average operating temperature is from 120 to 125 deg. The kilns are parallel to and adjoining each other with a common partition between. Large doors at each end of the outside and partition wall supply access. Each kiln has large steam coils at one end and an exhaust fan at the other.

The outside summer temperature is from 80 to 90 deg with a relative humidity of around 70 per cent. In winter the temperature rarely goes below 40 deg with a low humidity of around 50 to 54 per cent.

I have prepared an approximate solution to "H. W.'s" problem which is probably in line with methods currently used by many oven and kiln builders. Actually, these simple calculations are not complete, but they are carried out about as far as it is possible to go in a practical manner with the available information.

The required heat would be a total of the following losses taken under the most severe weather conditions:

1) Radiation losses from the walls to the outside air.
2) Heat required to evaporate the water at a temperature of 125 F.
3) Heat required to raise moisture from initial temperature to 125 F.
4) Heat absorbed by crates after they are actually dry.
5) Heat absorbed by cars as they move through the kilns.

Inasmuch as we do not know the weight of the crates or the construction and weight of the cars, items 4 and 5 should be added to the calculations shown below. However, these items are probably a comparatively small part of the total load. Furthermore, since air volume, velocity, and humidity also affect the drying operation, these calculations will be somewhat conservative.

In figuring the heat loss through the walls, it is assumed that there are times when only one kiln may be in operation. Therefore, the common wall is considered as an outside wall. The wall area including the ends amounts to 4628 sq ft. The *U* factor is taken as 0.75 Btu per sq ft per F.

$4628 \times 0.75 \times (125 - 40) =$ 294,950 Btu per hr, plus 100,000 Btu per hr for miscellaneous losses and leakage, totals 394,950 Btu per hr.

Each kiln produces 4000 crates in 10 hr or 400 crates in 1 hr. Since each crate contains 8 lb of water, we must evaporate 3200 lb per hr of water. The latent heat of evaporation at 125 F is about 1020 Btu per lb of water.

$3200 \times 1020 = 3{,}264{,}000$ Btu per hr.

To raise this water from 40 to 125 deg requires $3200 \times 1 \times (125\text{-}40) = 272{,}000$ Btu per hr.

The above losses total 3,930,950 Btu per hr. Now, after adding the requirements of Items 4 and 5, plus a safety factor for the initial heating up period in cold weather, our result may conceivably approach the 6,400,000 Btu per hr estimate mentioned in the original article. It should be emphasized here that we have discussed only the heat requirement *within* one kiln. To arrive at a fuel input for indirect air heaters there are additional losses to be reckoned with, such as heater efficiency, temperature drops in air ducts, etc.

I believe that the most practical method of determining this heat requirement would be for "H. W." to collect the condensate from the steam coils over a given period of time. This could quickly be converted into a positive load requirement under existing conditions.

It is my guess that this problem will eventually be solved by installing some oil burners in the present boiler.—R.W.S.

Setting Heights For Stoker Fired Boilers

THIS IS IN answer to the Question of the Month submitted by "S.R.A." in HPAC for November on the reasons there is a difference in the minimum setting height for cast iron and steel boilers.

First of all, the reason less distance is specified for cast iron boilers than steel boilers is that steel has a low heat capacity because of its relatively low mass, and with this low heat capacity, steel is able to deliver heat more rapidly on demand than cast iron.

However, the minimum setting height is determined by the equa-

tions on page 324 of the ASHVE's 1946 Heating, Ventilating, Air Conditioning Guide, which are based on the principle of preventing the flames from the fuel bed from being chilled, which would extinguish them by contact with the relatively cold surfaces before combustion is complete. These equations are empirical and take into account the greater distance that the evolved gases travel in a stoker fired boiler, which distance is much greater than that in a hand fired boiler.

Setting height is only one of several factors affecting the overall performance of a stoker-fired plant. These factors must be properly coordinated, which means that the best setting height for one particular installation may not be the best for another, depending on the other factors such as boiler or furnace design, ash storage space, and cleaning conditions. Experience of stoker engineers has shown that better coordination of these factors is generally obtained with less setting height in cast iron boilers than may be required in steel boilers.—R. R.

How to Design Snow Melting Coils

In recent issues of HPAC there have been published several questions —and answers to them—relating to snow melting coils, the amount of heat required for this service, and so on.

Concerning the Btu per hr equivalent of melting 1 in. of snow per hr, this has been tentatively fixed at 70 Btu per hr per sq ft of surface. This figure is based on snow having a density equivalent to 1/10 that of water and a latent heat of fusion of 144 Btu.

This Btu equivalent for 1 in. of snow melted per hr per sq ft of surface will, undoubtedly, vary from one part of the country to another and, while such a problem can be lengthened considerably in an attempt to achieve accuracy within 1 per cent, we have always considered that the U. S. Weather Bureau data in a given locality are reliable enough for all practical purposes. For example, in the Pittsburgh area, the anticipation of rise in rivers due to runoff from high points in the watershed is determined by the Weather Bureau engineers on the basis of 10 in. of snow being equal to 1 in. of water. It seems to me that the establishment of factors of this kind from the information obtainable from Weather Bureau offices should be sufficient for snow melting system design work.

Sizing the Boiler

It is our understanding that the efficiency of a stoker fired boiler is in the neighborhood of 70 to 80 per cent. This portion of the heat released in the boiler is absorbed by the water to be circulated in a snow melting system. In sizing the boiler, we have arbitrarily selected a figure of 100 Btu per hr per sq ft of area per inch of snow which, based on the 70 Btu per hr required to do the actual melting of 1 in. of snow, indicates another 70 per cent efficiency factor in the overall system. This latter figure is probably very conservative, particularly once the ground has increased in temperature due to the operation of the system, and a percentage of 80 would likely be more accurate. As can be seen, some engineering judgment is required to definitely answer this question and, for all practical purposes, I would expect the overall efficiency from the coal itself to the melting of snow to be in the neighborhood of 65 per cent.

Downward Loss

In connection with the downward loss factor given in our technical bulletin on radiant heating, the figures of 25 and 30 per cent were for radiant heating work and even for that purpose have since been indicated as being conservative. Factors of 15 and 20 per cent are more generally used. For snow melting work, it seems that a much wider range of downward loss factor should be considered due to variation in ground temperature from one part of the country to another and the operating characteristics of each system, primarily with regard to the control equipment. —Paul S. Park, engineering service dept., A. M. Byers Co.

Reader Wants Criticism of Garage Heating Job

You are invited to submit an answer to the following question from "W. O." for publication. Suitable answers will be paid for at regular rates, with additional payment for sketches. You are invited, too, to submit a question about heating, piping, or air conditioning for publication here.

There is a garage 100 x 100 ft with a 20 ft ceiling which is heated by wall radiation from a steam boiler in a small boiler room situated below the right hand front corner of the building, the floor of which otherwise rests upon the earth.

We have modernized the system by installing an oil burner and putting thermostatic traps on the radiators which now drain into the vented receiver tank of a boiler return and feed pump which brings the condensate back to the boiler as called for by a boiler control.

Besides the radiators along the walls of the garage, there is also one in a small office, which is partitioned off at the center front of the building with its own ceiling, several feet below the garage ceiling proper.

All is well except that in a garage of this kind one turns the heat on only in very cold weather and even then the burner is turned off during the times one of the three large doors, or gates, is kept open for some reason or other. This does not, of course, satisfy those who have to work in the office. They want heat even when it gets a little chilly.

To heat this office then, I figure on installing a hot water radiator therein, delivering the hot water from the steam boiler kept at a constant temperature by an aquastat.

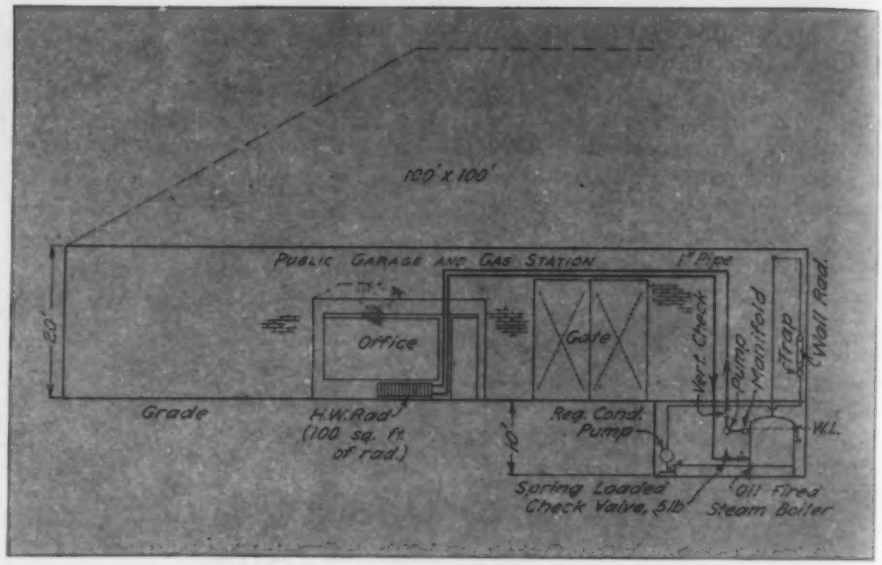
I would like to know whether there is anything wrong with the layout enclosed. As you will see, both circulating pipes will rise almost to the garage ceiling because there is a door in the way. Breaking the floor concrete and imbedding these pipes is too much trouble and a head would have to be overcome anyway and a pump used.

I figure to start with a manifold at the sectional cast iron boiler, then the pump, a check valve, and the line to the radiator; from the radiator,

"W. O." asks for comment on this layout

back the same way with a spring loaded check at the boiler in order to build up enough back pressure to keep the radiator filled and prevent siphonage. The pump would be started up by a thermostat.

My main question is: What kind of pump to use? The pump would be primed at all times, but it might become steambound at times. If the right sort of a pump is used, the scheme might work splendidly, but if I am wrong I'd surely like to be told about it. Cost is of no particular importance; the owner will pay for results.—W.O.



Novel Protective Means Reduce Corrosion Losses

ADVANCES in understanding of corrosion have led to novel protective methods which reduce maintenance and permit operation of equipment under conditions once impossible. The state of the art was summarized by Dr. Herbert H. Uhlig of the MIT corrosion laboratory in a recent joint symposium of the American Chemical Society, the American Institute of Chemical Engineers and the Electrochemical Society.

All common metals tend to revert to their ores or to other compounds; metals in which this tendency is weak are said to be more "noble." Nobility, however, is not constant, but depends on environment at any moment and on the materials in contact. On the manipulations of this environment has been built a complex science.

"Cathodic protection," which affords almost complete corrosion prevention, protects many miles of buried iron pipe lines and is being considered for protection of hot and cold water tanks. It depends on neutralizing the electric currents which flow between minute non-uniformities in the metal surface and cause the metal to dissolve. A direct current power source, connected at appropriate intervals to the metal, supplies current, which may range up to 0.5 amp per sq ft of pipe surface for pipes in an unusually corrosive soil. The metal preferably is painted, so that the required current is less and need protect only possible pinholes in the coating. In a widely used alternative method, buried pieces of zinc or magnesium are connected with the pipe to form a cell. The zinc or magnesium dissolves and must be replaced in perhaps one to 10 years. For some metals, corrosion can be reduced by purification, so that opportunities for electrolytic currents do not occur. Impure magnesium will corrode 100 to 500 times faster in sea water than will pure magnesium. This rate is controlled by removing the injurious impurities and adding protective ones.

The use of tin in a tin can or zinc in galvanized iron is revealed as another example of cathodic protection; at any break in the coating, current flows so that the tin or zinc dissolves first. The protection offered varies greatly, however; in sea water the zinc coating of galvanized iron will still prevent rusting of the base, even if there is a break several inches in diameter, while in some drinking waters the base will rust if there is a quarter-inch break. Other coatings, including tin, cadmium, and lead, are protective in some environments and injurious in others. New coatings include aluminum dipcoated on steel. A protective sheet of pure aluminum bonded metallurgically to a stronger but less corrosion resistant aluminum alloy has been used for some time.

Complex organic corrosion "inhibitors" find increasing use. Minute proportions of a material whose molecule is of the right size and shape will form a protective layer one molecule in thickness on the surface of metal. These compounds have been used to protect steel while rust or scale is being removed by acid, to protect oil well casings while acid treatment is being used to make the surrounding formation more porous and increase oil flow, and in automobile antifreeze solutions. They are being added to lubricating oils and to greases used to protect metal parts from finger printing or rusting during handling and shipment. Recently a volatile organic inhibitor has been produced which fills the air space around packaged steel parts.

Some causes of corrosion can be removed, notably in the instance of water for high pressure steam plants, where dissolved oxygen is removed by heating in specially designed deaerators. Where large volumes of cold water are involved, oxygen content can be reduced in new cold water deaerators, by spraying the water into a vacuum chamber. Bacteria found in sea water, some soils, and even wells in the middle west, can so change the environment of a metal as to promote corrosion, enough in one instance for a galvanized iron cold water pipe to fail in two years. For protection the bacteria must be killed by treating the water.

Advances are continually being made in development of new corrosion resistant alloys, particularly for use at high temperatures, as in gas turbines. Here, as elsewhere in this fight, progress is based on a new knowledge of the mechanism of protection.—*from the Industrial Bulletin of Arthur D. Little, Inc.*

SAM LEWIS' PAGE

Laundry Process Intrigues Engineer

I HAVE IN days past been taken to the laundry, stockwise, when having thought it nice to own some shares in a bank, I washed myself out by paying a double assessment. I have also been taken occasionally to a laundry on the business of ventilation or steam piping, but my interest was in ventilation or pipes and I paid little attention to the manufacturing processes. I had wondered, though, how they kept the clothes segregated, how my other shirt usually came back to me, and how rarely did I receive some other fellow's other shirt.

Recently—in carrying out a comprehensive modernization of my part of the mechanical equipment in the Adelman laundry in Milwaukee—I had some chance to observe the operating methods.

Belt Conveyor for Bundles

The entering textiles, arriving usually in bags or bundles, travel at table level on a belt conveyor and are carried alongside a series of highly specialized tables or desks, each presided over by an experienced and exceedingly vigorous lady. Arrangements are such, however, that this woman never is required to lift a heavy bag of material. She slides it off the conveyor to her immaculate white desk, dumps it, and straightens out and inspects every inch of each piece of cloth, whether it be table linen, a sheet, or some dainty lingerie. Each kind of goods, or each color of goods, goes into one of several separate clean mesh bags held open and ready in a semi-circle around the operator's desk.

When the particular family increment has been inspected and accepted and divided into its classes, the mesh bags are closed with large brass pins, each bearing its individual identification number, and only after the desk is cleared and the various bags are closed and passed along will the inspector press the electric button that moves the conveyor enough to present a new bundle of soiled material.

During this careful inspection many valuables that inadvertently may have entered the dirty clothes bag at home are retrieved. Observation and record is made of damaged or torn or stained pieces that otherwise might be the basis of unjust claims. The mesh bags are woven of string, with every intersection knotted, like a fishnet. The mesh seems to be about ½ in. in size. Cotton, wool, silk, and the like go in separate bags for separate treatment.

Big Washing Machine

The next process is to dump the bags of like character—each bag representing one family—into a great washing machine barrel that may receive 50 bags or more from 50 families and which receives hot water, soap, and mechanically applied "elbow grease" through the medium of an electric motor. The barrel, with its load, revolves and churns and great billows of soapsuds seek to emerge. After a carefully and expertly allotted time the barrel is quieted down, and several rinses of unsoaped hot soft water are administered.

Then the doors in the barrel are opened and the mesh bags of cleaned and sterilized clothes are removed and are dropped by the aid of electric hoists into a great stainless steel colander-like container or perforated deep bowl which, with its burden of hundreds of pounds of wet cloth, is lowered gently into the maw of a centrifugal dryer. This machine is as big as a jeep. When its cover is fastened down the colander-screen holding the bags is spun like a top, around a vertical shaft and when this process is finished and the cover is hoisted off, the mesh bags are found stacked up tightly, due to centrifugal force around the edges of the bowl, and are Sahara-dry.

In an efficient metropolitan laundry there may be six or twelve or more of these big washing machines, but each washer by no means requires a separate centrifugal dryer, since washing and rinsing takes more time than wringing out. It will be noted that the mesh bags (of strong, heavy string) protect the cloth that is being washed from abrasion, danger of tearing, etc. From the dryers the bags go to the ironers, the contents of each still being family-segregated and identified.

At the ironers the clean textiles say farewell to the bags, which go back to the inspector-receivers for another cycle. I'd say those frequently laundered mesh bags are *clean!* The delicate fabrics—such as fine handkerchiefs, laces, and the like—go to special, relatively small, and very gentle washing machines and receive extra mild soap or other solvent. The flat wares—sheets, napkins, tablecloths, etc.—are ironed in great steam heated rolls as big as one's living room.

The cloth is fed to each of these ironers by two or three operatives and is taken off each machine for folding by at least two people. Pieces other than flatware to be ironed require hand labor, using steam heated machines similar to those employed for ironing men's clothing in tailor shops. One remembers the old hand laundry where John sprinkled what needed sprinkling before pressing by squirting water through his teeth.

Some sprinkling of course is necessary to do a good ironing job, but the tooth-squirting method is not looked on with favor in a modern

Samuel R. Lewis, consulting mechanical engineer, and a member of HPAC's board of consulting and contributing editors, contributes informal comment on heating, piping, and air conditioning matters each month. He visits a modern laundry and describes the "manufacturing process" this time, being particularly amazed at getting his dirty shirt cleaned, dried, starched, and pressed in a fast seven minutes.

laundry. Each ironer (and the ironers are all young and beautiful) is provided with a tiny water sprayer connected to a small flexible hose and responding instantly to her touch. This hangs near her on springs.

There are special electric sewing machines strategically placed, all threaded and willing, to attach buttons or to make the little repairs that I have occasionally found so neatly done on worn spots in my other shirt.

I noted that of the hundreds of women—all working very intensively—not one was ever required to lift a heavy bundle. Unprocessed material as well as processed material arrived and departed to each station by trolley or by belt conveyor.

They had an attractive employees' lunchroom, immaculate locker and restrooms for the employees, and the illumination was of high intensity—so that being in the business of removing dirt, the dirt could be seen.

An Efficient Plant

Mechanically, this plant—from oil burning high pressure boilers to glass lined hot water storage tanks, to stainless steel and copper piping, to corrosion-abolishing heat transfer devices—was efficient and was thoroughly policed by indicating and recording instruments.

They use softened water, and electric energy is generated on the job as a byproduct of the great amount of steam necessary in a laundry. They even save all possible heat in the water that leaves the washers on the way to the sewer by transferring the heat to the entering cold water through watertight barriers.

I saw no junk heap around this plant. I saw great machines representing heavy capital investment being moved out and superseded by more efficient machines.

I saw that the plant was prosperous and that much of the incoming things to be laundered arrived in chauffeur-driven limousines.

I worked pretty hard in some warm areas in the boiler room and became wet with perspiration and ruined the appearance of my wilted-down shirt.

"Slip out of that shirt at once," ordered the proprietor. Reluctantly, I gave it up and sat shirtless for seven minutes in his comfortable office. At the end of seven minutes my clean, dry, starched, pressed, shirt came back to me. I call that service!

He Cuts 'Em Up

On the August Editor's Pages, we published a complaint from one of our readers about the way we now number our pages. In commenting, we said that many readers bind the complete issues every year and that others preserve the complete issues unbound. M. Hirsch, consulting engineer of London, has written to describe his system of preserving articles from back numbers:

"I have been reading your magazine for 17 years by now. But you would be astonished (if not disappointed) when looking at my library that there are neither rows of neatly bound volumes nor piles of individual issues.

"What do you think is the best manner of appreciation of your publications? To fill and embellish libraries that the reader has pleasure and visitors admire? Certainly not! I should think you and the authors expect that readers make the best use of the published papers and therefore handle your magazine in such manner that articles are at hand whenever a problem arises which has relation with such article. When assuring you that I followed this idea, you will, I hope, forgive me in what rude manner I prepare the individual issues. I look through the advertisements, make the best use of them, and then throw them away. I am just as rude when making cuttings only out of your notes on new equipment, trade literature, and meetings.

"There remains a mutilated issue but still I go on with my barbaric method. I separate those articles which concern my activities and arrange them in files, using a classification, and there they meet all publications on the particular subject which I have collected together with notes relating to articles which are not in my possession.

"When doing this it often happens that the end of an article has the beginning of the following article attached. I do not like this, because I have to make a note on one of the two papers where to find the missing page. I do not know any method that I could suggest to overcome this difficulty without wasting paper. However, it might be possible to keep this point in mind. Many magazines make it a rule to bring the ends of papers in single columns mixed with advertisements at the end of the issue. I do not like this method either. Fortunately, you do not use it.

"I may say that very often I have been consulted where to find this and that information by friends who were quite surprised that the source existed in their library as a sleeping beauty waiting to be awakened."

ICI GOES ON INACTIVE BASIS

Indoor Climate Institute, organized in 1943 and "dedicated to the principle of educating and informing the public of the benefits which come from the use of central heating and automatic firing," has announced that beginning December 1, it has gone on an inactive basis, pending determination as to whether or not "industry segment" activities in the form of educational and promotional programs will accomplish the same results.

All officers and present directors of the institute will remain in office, and an adjustment will be made with those members who have paid current dues, says Walter Davis, ICI's managing director.

ONWARD AND UPWARD

W. S. Bodinus has been appointed Chicago district manager of the Carrier Corp. direct sales division, and J. H. Bailey has been named Cleveland district manager. Other changes include the naming of W. H. Steitler as Dallas district manager, and the assignment of Walter F. Jones as centrifugal gas compressor specialist.

Mr. Bodinus is the author of several articles on air conditioning standards that have been published in HPAC, and Mr. Bailey has contributed articles on air conditioning a printing plant and a river steamboat to these pages.

Conductivities and Conductances of Building Materials and Insulations

By Paul D. Close

A COMPREHENSIVE tabulation of conductivities of various materials was published by the American Society of Refrigerating Engineers in 1922 in a report entitled Heat Transmission of Insulating Materials. These data were compiled by Charles H. Herter from various sources and were divided into four groups: (1) vegetable matter, (2) mineral matter, (3) animal matter, (4) metals.

Reference is made to the foregoing tabulation of conductivity data not only as a matter of historical information but also because this compilation has been extremely useful and valuable to many engineers and others interested in heat transmission calculations. While much of this information probably is now obsolete because of changing materials and improved test methods, it is still of interest, and the opinion has frequently been expressed that a compilation of data derived since this report was published would be valuable.

Conductivity and conductance values, based on tests conducted since the American Society of Refrigerating Engineers report was published, have been compiled by the author from published sources and are given in Tables 1 to 11 inclusive. It will be noted that the values in Tables 1, 3, 6, 7, 8, 9, 10 and 11 are conductivities (k) and are therefore based on a 1 in. thickness of the material reported in each case. Tables 2 and 4 are conductances (C) and are for thicknessess other than 1 in. or for combinations of two or more materials. Table 5 contains both conductivity and conductance values. All coefficients express the rate of heat transfer between the material surfaces in Btu per hr per sq ft per deg Fahrenheit temperature difference per inch thickness (where the conductivity is given) or for some other thickness or combination of materials (where the conductance is given). Resistances (R) or resistivities, which are the reciprocals of the conductances or conductivities, are also listed, as well as the authorities.

While the tests were conducted by generally reliable sources, no claim is made as to the accuracy of all of the values given in these tables nor is there any certainty that the figures for proprietary materials correspond with those for similar materials purchased in the open market. These and other pertinent facts should be considered when using these data.

Tables 1 and 2 are published this month, and the others will follow.

[Note: Mr. Close is technical advisor for Simpson Industries, Inc., sales division of the Simpson Logging Co. He was formerly technical secretary of the Insulation Board Institute, and before that was technical secretary of the American Society of Heating and Ventilating Engineers.]

DATA SHEET

TABLE 1—CONDUCTIVITIES (*k*) OF SOLID MASONRY MATERIALS

These coefficients are expressed in Btu per hour per square foot per degree Fahrenheit temperature difference per inch thickness.

MATERIAL OR TRADE NAME	DESCRIPTION	DENSITY (lb per cu ft)	MEAN TEMP. (F)	CONDUCTIVITY (*k*)	RESISTANCE (*R*)	AUTHORITY OR REFERENCE
Brick	Damp or wet			5.0	0.20	(2)
	Common yellow clay brick			4.8	0.21	(4)
	High density face brick			9.2	0.11	
Concrete	Sand and gravel, various ages and mixes			11.35 to 16.36	0.09 to 0.06	(5)
	Sand and gravel aggregate	142	75	12.6	0.08	(4)
	Limestone aggregate	132	75	10.8	0.09	(4)
	Cinder aggregate	97	75	4.9	0.20	(4)
	Steam treated limestone slag aggregate†	74.6	75	2.27	0.44	(4)
	Pumice (mined in California) aggregate†	65.0	75	2.42	0.41	(4)
	Expanded burned clay aggregate†	59.9	75	2.28	0.44	(4)
	Burned clay aggregate†	67.1	75	2.86	0.35	(4)
	Concrete plank	76	75	2.5	0.40	(3)
	Cellular concrete	40.0	75	1.06	0.94	(3)
	Cellular concrete	50.0	75	1.44	0.69	(3)
	Cellular concrete	60.0	75	1.80	0.56	(3)
	Cellular concrete	70.0	75	2.18	0.46	(3)
	1 bag cement to 3 cu ft Zonolite concrete aggregate	37.63	75	1.07	0.935	(3)
	1 bag cement to 5 cu ft Zonolite concrete aggregate	27.40	75	0.69	1.45	(3)
	1 bag cement to 8 cu ft Zonolite concrete aggregate	22.86	75	0.60	1.67	(3)
	1 bag cement to 12 cu ft Zonolite concrete aggregate	18.19	75	0.55	1.82	(3)
	1 bag cement to 14 cu ft Zonolite concrete aggregate	15.99	75	0.48	2.08	(3)
	1 bag cement to 16 cu ft Zonolite concrete aggregate	15.71	75	0.46	2.17	(3)
Gypsum	Solid gypsum partition tile†			2.41	0.42	(4)
	87½% gypsum, 12½% wood chips	51.2	74	1.66	0.60	(4)

†See Thermal Conductivity of Building Materials, by F. B. Rowley and A. B. Algren. (University of Minnesota Engineering Experiment Station Bulletin No. 12).

TABLE 2—CONDUCTANCES (*C*) OF HOLLOW MASONRY MATERIALS

These coefficients are expressed in Btu per hour per square foot per degree Fahrenheit temperature difference for thickness stated.

MATERIAL	DESCRIPTION	DENSITY (lb per cu ft)	MEAN TEMP. (F)	CONDUCTANCE (*C*)	RESISTANCE (*R*)	AUTHORITY OR REFERENCE
Clay tile, hollow	2" tile, ½" plaster both sides	120.0	110	1.00	1.0	(2)
	4" tile, ½" plaster both sides	127.0	100	0.60	1.67	(2)
	6" tile, ½" plaster both sides	124.3	105	0.47	2.13	(2)
	8" tile, average of 8 types†			0.52	1.92	(4)
	12" clay tile†			0.26	3.84	(4)
8" concrete blocks, hollow* 8 x 8 x 16" 3 oval core	Cinder aggregate	86.2	40	0.58	1.73	(4)
	Haydite aggregate	67.7	40	0.50	2.00	(4)
	Sand and gravel aggregate	126.4	40	0.90	1.11	(4)
	Limestone aggregate	134.3	40	0.86	1.16	(4)
	Air cooled slag aggregate		40	0.68	1.47	(4)
12" concrete blocks, hollow* 8 x 12 x 16 3 oval core	Cinder aggregate	86.2	40	0.53	1.88	(4)
	Cinder aggregate blocks with granulated cork in cores (5.24 lb per cu ft density)			0.24	4.17	(4)
	Sand and gravel aggregate	124.9	40	0.78	1.28	(4)
	Haydite aggregate	76.7	40	0.47	2.13	(4)
	Haydite aggregate blocks with granulated cork in cores (5.60 lb per cu ft			0.17	5.88	(4)
Gypsum tile	3" three cell partition tile†			0.74	1.35	(4)
	4" three cell partition tile†			0.60	1.67	(4)

†See Thermal Conductivity of Building Materials, by F. B. Rowley and A. B. Algren. (University of Minnesota Engineering Experiment Station Bulletin No. 12).

*For other types of hollow block walls, see Thermal Conductivity of Building Materials, by F. B. Rowley and A. B. Algren. (University of Minnesota Engineering Experiment Station Bulletin No. 12).

References—see last column of tables:

(1) United States Bureau of Standards. (2) Tests conducted at University of Illinois by A. C. Willard, L. A. Harding, L. C. Lichty, and others. (3) Tests conducted at Illinois Institute of Technology (Armour Research Foundation), by J. C. Peebles. (4) Tests conducted at University of Minnesota, by F. B. Rowley, et al. (5) American Society of Heating and Ventilating Engineers Research Laboratory. (6) Tests conducted at Pennsylvania State College by Hechler and Queer. (M) Data from manufacturer; authority not stated.

Heating, Piping & Air Conditioning

AMERICAN SOCIETY of HEATING and VENTILATING ENGINEERS

Journal Section

Rating Dynamic Dehumidification Equipment

By E. R. Queer* and E. R. McLaughlin**, State College, Pa.

SUMMARY — Maintenance of the relative humidity of 30 per cent has been found to prevent corrosion of equipment on naval vessels on the inactive list. Development of dehumidification equipment was sponsored by the Navy Department to insure economy and reliability in operation. Test equipment and methods used in determining capacity and performance of dehumidification are described. Performance and test results of typical single and dual bed dynamic dehumidifiers are included.

THE United States Navy postwar inactive fleets are presently being put under preservation in what has been popularly called *Operation Zipper*. The chief purpose of the preservation program is to economically maintain the ships in a condition of readiness for 20 years or more in the event another national emergency should necessitate their quick return to service. It is of utmost importance that all equipment and stores excepting perishable items, ammunition, and gasoline be kept secure in place aboard the ships. Experience following World War I in the *Red Lead Fleet* with heavy grease demonstrated the need for new and more effective means of preventing corrosion, verdigris, tarnish, mildew and rot. All of these items are the effect of moisture on materials with which the ship and its equipment are constructed. Dehumidification, or the removal of moisture from the air, is the major new development in this program and it is the most notable of the various specific methods employed.

In 1924 preliminary work was started by the Navy with low humidity atmospheres aboard inactive submarines to prevent the electrical circuits from grounding. In this and subsequent work it was determined that if a 30 per cent relative humidity atmosphere could be maintained within the vessel, the deleterious effects of excessive moisture would be arrested. Recent experience with test samples of untreated and polished mild steel suspended for a prolonged period of two years in a dehumidified atmosphere of 30 per cent relative humidity has confirmed previous results regarding corrosion. They have remained bright and perfectly free of corrosion and dust. Desiccation in these early experiments was obtained with calcium chloride. This proved unsatisfactory because it necessitated entering the ship frequently to remove the solution. In handling, small amounts of the solution were spilled and excessive corrosion occurred where it came in contact with the ship. Later, automatic machines employing silica gel and activated alumina were used but the imminence of war placed all available ships in service and made it necessary to delay the preservation project for more urgent work.

Late in 1943 the Bureau of Ships again undertook the task of further developing the technical policies and procuring the necessary equipment to preserve the large number of inactive ships that would be on hand in peace time. The chief problem was to secure a dry atmosphere with the best economy obtainable, with the minimum of attendance and maintenance. Since temperature control was not considered essential it was decided to continue with machines employing solid chemical desiccants. The main function of the machine, briefly stated, was to automatically remove water from the ship's air, pass it overboard, and return the dry air to the ship with sufficient pressure to assure adequate distribution of small quantities of air through the fire mains. This dehumidification problem differs from most desiccant drying problems in that very low and uniform dew points are not required. The equipment need only remove moisture from the ship and be of sufficient capacity to main-

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tain an atmosphere of 30 per cent relative humidity.

Several manufacturers built equipment of this kind without incorporating all the characteristics considered necessary, *i.e.*, maximum water adsorption at good power economies along with reliable operation. These characteristics were a *must* in a program that would be faced with a declining budget and a small attendant force in future years. In order to secure information on equipment being built and to develop specifications, a testing program was instituted at the Engineering Experiment Station, The Pennsylvania State College. The climatometer facilities installed early in the war in this laboratory by the Office of Production Research and Development, War Production Board, were considered to be well adapted for work of this nature and they were made available. With these facilities, accurately controlled humidity and temperature conditions could be obtained for rating the dehumidification equipment.

Originally the chief purpose of the testing program, as reported herein, was to develop an adequate test procedure for securing capacity and performance data upon which to formulate specifications for procurement of the equipment. Simultaneously with the capacity tests, performance tests were made on the long-time operation of the machines to determine the durability of the operating mechanisms and the desiccants. Capacity measurements were made at three-month intervals in the long term tests. Subsequently, check tests were made on an occasional machine picked at random from the assembly line to assure that production continued to meet specifications.

Test Procedure

The primary objective of the test procedure was to determine the moisture removal rate when air at specified conditions was circulated through the dehumidifier. The moisture which was removed from the air stream was adsorbed by the desiccant and retained until reactivation was effected. Consequently, it was apparent that one method of determining the moisture removal rate was to weigh the desiccant bed before and after the adsorption phase of each cycle. As it was not practicable to weigh the

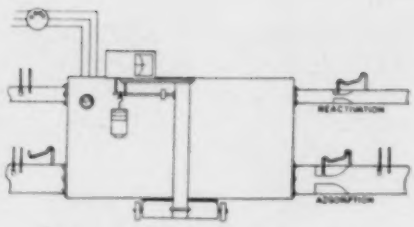

Fig. 1—Arrangement of testing equipment

desiccant alone, the entire dehumidifier was mounted on platform scales as shown in Fig. 1. The total weight of the dehumidifier and attachments in some cases was as much as 1500 lb. The total weight of moisture adsorbed during a single adsorption period was seldom in excess of 10 lb. This required a reliable mechanism in order to reduce the error of observation. The platform scales were equipped with a precision indicator which served a dual purpose. It was necessary to have a certain amount of duct work attached to the dehumidifier during test. The precision indicator assured that the scale platform came back to the same level for each observation and automatically kept the tare weight constant. This indicator also permitted observations to 0.1 lb which was accepted as sufficiently accurate for determining adsorption weights of 2 lb or more. Before the adsorption was started, known weights were added to the dehumidifier and the scales were balanced. This was used as the *zero* or datum weight for the determinations. As adsorption progressed, and the weight of moisture in the desiccant increased, increment weights were removed from the known weight to keep the scales balanced on the indicator *zero*. The weight removed was equal to the weight of moisture adsorbed. During reactivation as the weight of moisture in the desiccant decreased, weight was again added to the dehumidifier to keep the scales on *zero*. Frequent and timed observations of the weight permitted plotting a curve of the weight of moisture removed. The slope of this curve is proportional to the rate of water adsorption.

An alternative method for determining the moisture removal rate and checking the weights was to utilize the psychrometric readings obtained from the inlet and outlet air streams to calculate the weight of moisture adsorbed. This required calibrated equipment and a definite technique for observations. A calibrated orifice was used to meter the air flowing into the unit. The test conditions were held constant and the calculations of the volume and weight of air handled were simplified considerably by metering at the inlet. Inlet air conditions were fixed by maintaining the test room conditions constant. This was readily achieved by placing the dehumidifier and the test equipment in the test room from which inlet air was taken directly. The outlet air was discharged to the weather since it varied over a wide range of temperature and dew point during each cycle. Make-up air leaked in through openings in the wall and mixed constantly with the conditioned air. Variations of the effluent air made determination of the conditions difficult. The dry bulb temperature was seldom constant and the simultaneous wet bulb temperature was difficult to obtain. After considerable checking with a dew point cup and a humidity analyzer, a wet bulb technique was developed which gave reliable results. A very important part of the technique was timing. In order to have an accurately timed wet bulb reading, it was necessary to insert the wet bulb thermometer into the effluent stream two minutes before observation time.

In converting the wet and dry bulb readings to dew points or specific humidities, it was necessary to use the proper barometric pressure. A large scale psychrometric chart for 29 in. Hg barometric pressure was prepared for this purpose. Specific humidity in pounds of water per pound of dry air was plotted against time. The difference between inlet and effluent humidities represented the moisture removed from each pound of air as it passed through the dehumidifier. This difference multiplied by the instantaneous rate of air circulation gave the instantaneous rate of moisture removal. A summation of the instantaneous rates of moisture removal gave the total weight of moisture adsorbed during the cycle. This weight was compared with the changes in weight observed by the scale readings. When the data for the adsorption and reactivation phases of the cycle are utilized, the weights for the two phases should be the same when the scales indicate that the cycle is balanced. In other words, the water content of the desiccant should return to its exact original condition. A plot of

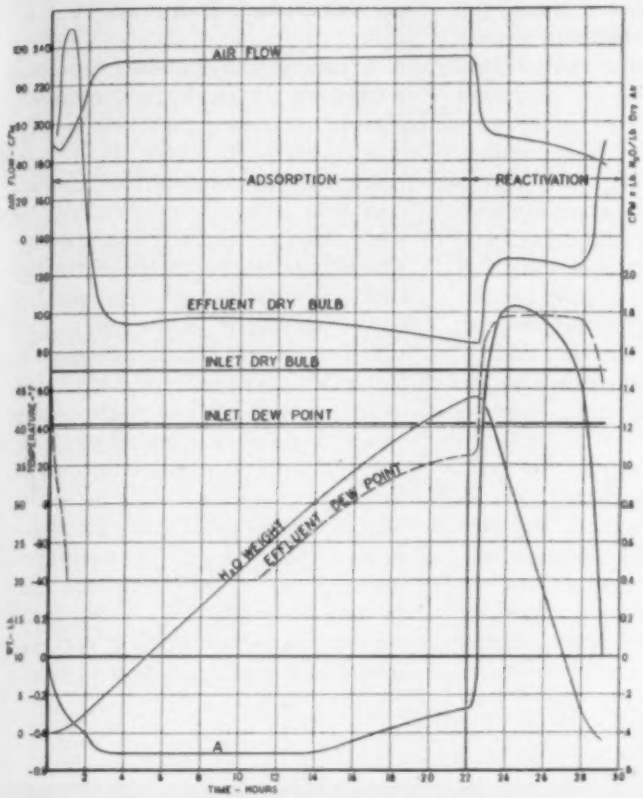

Fig. 2—Characteristic curves for a dehumidifier using a thick bed of silica gel

the calculation of instantaneous rates of moisture removal appears as curve *A* in Fig. 2. A summation of the instantaneous rates of moisture removal was made by measuring the areas between the zero base line of cfm × lb H_2O/lb dry air and curve *A* in Fig. 2. For the adsorption part of the cycle the area is 19.73 units. Each unit of area is equivalent to 2.15 lb of moisture. This gives a total adsorption of 42.5 lb of moisture. For this test the scales indicated a total adsorption of 43.9 lb of moisture. The observed weight was 3.3 per cent greater than the calculated weight.

The area under the reactivation phase of the cycle is 20.1 units representing a total desorption of 43.4 lb of moisture. The weighings indicate that a total of 44.9 lb of moisture were removed by adsorption. (The desiccant was more completely activated at the end of the cycle than it was at the beginning). The observed weight was 3.5 per cent greater than the calculated weight.

The percentage difference in each case is within reasonable allowable limits. However, the consistency and the positive signs of these percentages is interesting. Leakage into the system down stream of the metering orifices probably accounts for the discrepancy. On this unit the inlet and desiccant bed were under negative pressure. Leakage on the effluent side of the fan would have very little effect on the calculations.

Single Bed Dehumidifier

Fig. 2 shows the characteristic curves for a single bed silica gel type of unit operating with parallel flow, *i.e.*, the reactivation air flows in the same direction through the desiccant as the air for adsorption.

A consideration of the individual curves will illustrate the performance of a dynamic unit. At the beginning of the cycle the bed was *activated*. A large portion of the desiccant bed was heated to a temperature of 250 F or higher. When the effluent temperature reached 190 F, a thermostat actuated the valve mechanism and the air flow for adsorption was established. It was necessary for the air to cool a layer of the bed before adsorption could take place. As the heat in the bed was transferred to the air stream, the effluent air was very hot for the first part of the cycle. In addition to the residual heat in the bed there was an energy exchange taking place in the zone of adsorption where the heat of adsorption was also transferred to the air stream. This accounted for the consistent temperature rise in the dry bulb temperature of the air as it passed through the unit during the 8 hr period 3 hr to 11 hr. During this time the rate of adsorption was constant (See Fig. 2, curve *A*). The temperature rise of 26 F represented a moisture removal of 39 grains per pound of air or 2.8 grains per cubic foot of entering air. This is approximately 9 degree (F) temperature rise per grain removed per cubic foot. After 11 hr, when the *break point* in the effluent dew point curve was reached, the adsorption rate decreased and the outlet dry bulb temperature decreased as adsorption continued. The adsorption phase of the cycle was controlled by a timer which in this instance stopped adsorption at 22 hr.

The outlet dew point curve indicated that adsorption started as soon as a thin layer of the desiccant was cooled sufficiently to permit adsorption. A very thin layer of the desiccant cooled quickly and adsorption began almost immediately. However, it required some time before the cooled portion was thick enough to reduce the dew point below –30 F. In Fig. 2 this time is shown to be approximately one hour. During the next several hours, or until 11 hr had elapsed, the effluent dew point remained low, approximately –40 F. and a high percentage of the moisture in the entering air was adsorbed. Following the break point the effluent dew point curve rose very rapidly and would ultimately become asymptotic to the inlet dew point curve if the timer had not interrupted adsorption at 22 hr.

The observed weights are plotted in Fig. 2 showing how the adsorption weight increased at a constant rate until the break point was reached and the rate gradually decreased. At 70 F and 35 per cent relative humidity the quantity of desiccant used in this unit has a potential adsorption capacity of approximately 50 lb of moisture. In order to maintain a satisfactory average moisture removal rate it was necessary to terminate adsorption before the ultimate capacity was reached; however, not before the break point was reached. Another consideration was the fact that the nearer saturation is approached during adsorption, the more economical will be the reactivation.

For the first half hour after the

reactivation circuit was established the net result of the operation of the unit was a slight adsorption. This lag was caused by the heat capacity of the bed. After ½ hr heating, the reactivation started and the rate increased very rapidly. . The outlet dry bulb (Fig. 2) increased to a peak and slowly fell off until reactivation was nearly complete. This phenomenon of falling dry bulb temperature is typical of units incorporating parallel flow, *i.e.*, the reactivation air flows through the bed in the same direction as the adsorption air. When reactivation began, the inlet face of the bed was nearly saturated. Consequently, the moisture removed from the desiccant near the inlet was carried through the bed and part of it was readsorbed by the partially saturated desiccant at the outlet. The heat released during readsorption raised the temperature of the air above the normal reactivation effluent temperature. As reactivation progressed down through the bed, the readsorption diminished, and just before reactivation was completed it ceased altogether. This decreasing readsorption accounted for the decreasing dry bulb temperature as reactivation progressed. When the desiccant was completely reactivated, heat for desorption was no longer required and the outlet dry bulb rose very rapidly to approach the temperature of the air leaving the heaters and entering the bed. This rapid rise in temperature was used to terminate the reactivation phase of the cycle.

These curves illustrate the performance of a dynamic dehumidifier. A single bed unit having a thick bed of desiccant was chosen for analysis to provide a long cycle incorporating all the features of a dynamic unit.

Dual Bed Dehumidifier

A unit employing two desiccant towers and a short cycle is more adaptable to the ship preservation program. Units of this type, Fig. 3, circulate a larger volume of air through thin beds, one bed being reactivated while the alternate bed is adsorbing. These features change the characteristic curves materially, and the test procedure had to be altered to provide the required data. In order to obtain scale weights it was necessary to make one bed inoperative while observations were being taken on the operating bed. The cycles were short, ranging from 30 min to 3 hr, and it was very important to time the observations properly. The equipment shown in Fig. 1 was used for the tests on dual bed units. Fig. 4 represents curves observed on a unit of this type employing activated alumina as the

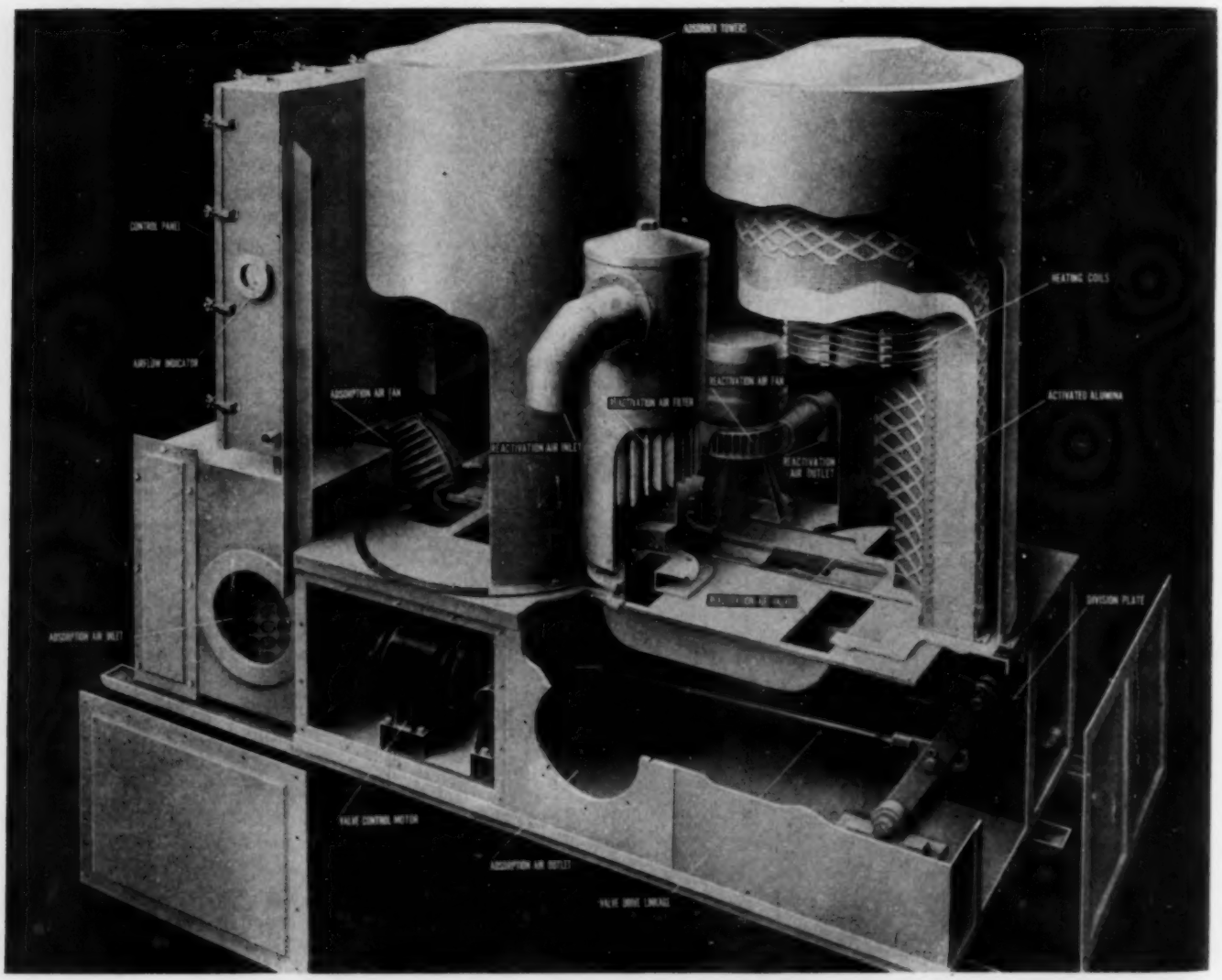

Fig. 3—A typical dual bed desiccant dehumidifier

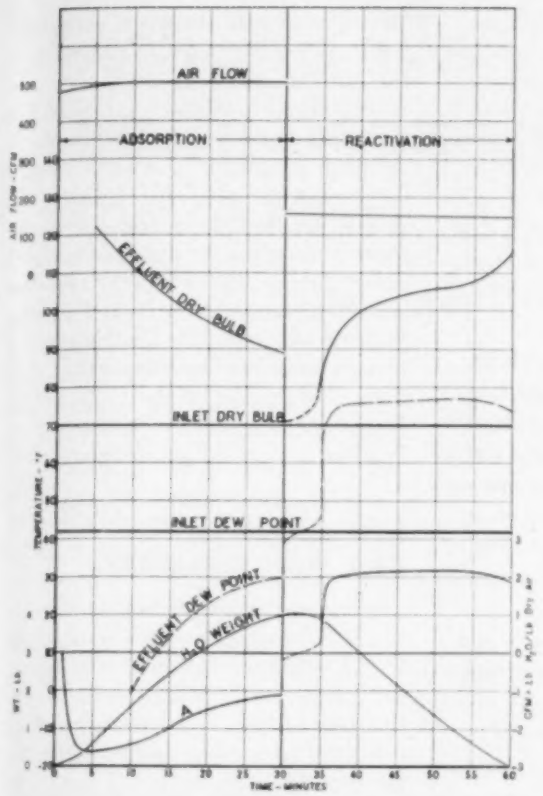

Fig. 4 — Characteristic curves for a dehumidifier using a thin bed of activated alumina

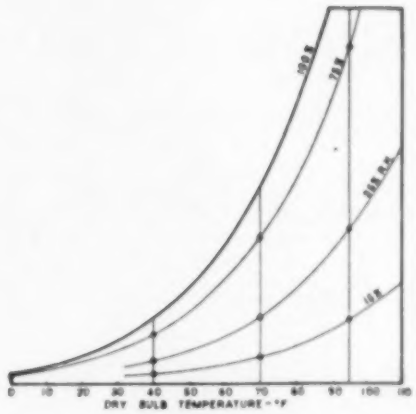

Fig. 5—Distribution of test points on psychrometric chart

desiccant. It will be noted that there is some similarity to the curves in Fig. 2. The bed is thin and the air velocity high enough to eliminate completely the break point. A timer controls the cycles and the bed is not reactivated to dryness. These units employ counter flow during reactivation and readsorption characteristics do not appear.

The area under the adsorption rate curve *A* in Fig. 4 is 10.9 units. Each unit is equivalent to 0.36 lb of water, and the total adsorption is 3.93 lb of water which compares with 4.0 lb indicated by the scales.

The area under the reactivation rate curve is 10.5 units representing a weight of 3.8 lb of water. This is 95 per cent of the observed weight of 4.0 lb of water. The discrepancy of 5 per cent is logically attributable to leakage into the reactivation circuit since the air was under a slight negative pressure as it flowed through the dehumidifier. A test for leakage disclosed 5 cfm when the circuit was subjected to a pressure differential of 0.55 in. water.

The curves in Fig. 4 are typical of a dual bed unit meeting the requirements for ship board use. Total adsorption is not attempted nor is it necessary. Only the moisture in excess of 35 per cent relative humidity is conducive to corrosion and it is more desirable to reduce the humidity than to totally remove it, since the nearer total adsorption is approached, the more expensive the operation becomes.

A dual bed unit also provides a continuous source of dehumidified air and has a greater capacity per pound of dehumidification equipment. By the use of thin beds and other features, the dual bed unit can operate at maximum economy.

The economic characteristics of the units are readily compared by the power costs for reactivation. The economy is expressed as kilowatt-hours per pound of water desorbed; consequently, a low figure represents an efficient operation. It was desirable that the economy should not exceed 1 kwhr per lb. After analysis of the initial test results, the manufacturers were able to incorporate new features in their designs to reduce the economy for a large part of the operation considerably below 1 kwhr lb.

Test Conditions

In addition to developing a test procedure, it was necessary to establish the conditions at which tests were to be made. Specific conditions of temperature and humidity were chosen to facilitate comparisons of the performance of individual units. For this purpose the 10 points represented in Fig. 5 were selected. These test conditions do not include the extreme conditions under which a dehumidifier may be required to work but they do cover the normal field of the psychrometric chart.

Table 1—Performance Data of Dehumidifiers

Inlet Air Condition			Activated Alumina Machine			Silica Gel Machine			Silica Gel Machine		
DB F	DP F	RH %	H_2O Ads Rate lb/Hr	Economy kwhr/lb H_2O	Machine Data	H_2O Ads Rate lb/Hr	Economy kwhr/lb H_2O	Machine Data	H_2O Ads Rate lb/Hr	Economy kwhr/lb H_2O	Machine Data
95	64	35	8.6	0.83	500 cfm–Ads	9.4	0.70	430 cfm–Ads	7.5	0.84	400 cfm–Ads
70	42	35	8.0	0.92	5.5 in. SP Ads[a]	7.6	0.88	5.5 in. SP	7.2	0.92	5.5 in. SP
40	15	35	3.8	0.96	150 cfm–React	3.1	1.10	156 cfm–React	3.3	0.92	79 cfm–React
0	−6	75	1.8	2.06		1.2	6.58		1.5	1.50	
95	64	35	2.9	0.77	150 cfm–Ads	4.7	0.80	250 cfm–Ads	5.8 lb/day	0.82	20 cfm–Ads
70	42	35	2.4	0.91	3.4 in. SP Ads	4.0	0.93	5.5 in. SP	5.5 lb/day	0.85	½ in. SP
40	15	35	1.3	1.81	70 cfm–React	1.8	1.25	82 cfm–React	3.2 lb/day	1.53	15 cfm–React
0	−6	75	0.5	5.37		0.8	2.96		1.2 lb/day	4.68	

[a]Static Pressure—Adsorption Outlet.

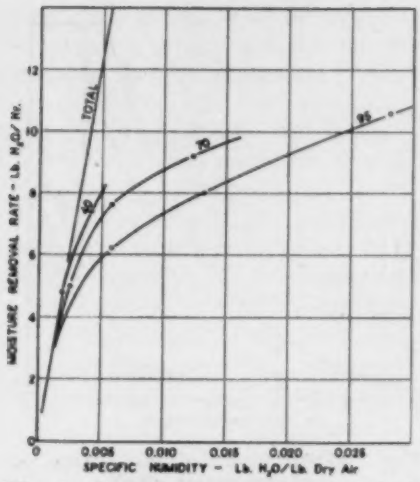

Fig. 6—Capacity curves for dual bed dehumidifier

For effective preservation the ship's space is to be maintained at approximately 30 per cent relative humidity. For that reason the 35 per cent relative humidity line was chosen and tests at three temperatures, 40, 70 and 95 F were selected to provide data on the effect of temperature on performance. During the initial drying period after installation aboard ship, the dehumidifier will operate on air of relatively high humidity. For the purpose of determining performance under this condition, the 75 per cent relative humidity tests were chosen. To provide a third point at each temperature, the 15 per cent relative humidity tests were chosen.

Of these tests the most attention was focused on the 70 F, 35 per cent relative humidity test since it was the most representative. Considerable testing was done at the other two 35 per cent relative humidity conditions. A test at 0 F was made primarily for observation of the mechanical operation at low temperatures and although an attempt was made to determine capacity it was difficult to observe weights accurately at this low temperature.

Performance Summary

A summary of the performance of typical units is given in Table 1. These data are for the four basic test conditions. Fig. 6 is a plot of the data for a dual bed unit and indicates the effect of temperature and specific humidity of the air entering the unit upon capacity. The curves indicate that for a given entering moisture content, increase of the dry bulb temperature will reduce the performance of the dehumidifier. The power requirement of reactivation under these same conditions is shown in the plot of economy vs. entering humidity in Fig. 7.

Units effecting dehumidification by means other than solid adsorbents were also tested with only slight modifications in the test procedure.

The test procedures and methods described herein were developed for a specialized problem. Few industrial problems will compare with the ship preservation program. Consequently, modified dehumidification equipment will be necessary for each type of application. Modifications can be guided only by experience or research. Perhaps the most important part of the Navy program, next to preserving the fleet, was the initiation of a test program to guide the services and industry in the specification and selection of dehumidification equipment. As interest in the control of moisture and the adverse effects of moisture on materials increases, the requirements for dehumidification are going to increase. It is hardly necessary to say that the problems will increase. It is hoped that this paper may serve as a nucleus for the development of test procedures for other dynamic dehumidification units.

Acknowledgement

The Pennsylvania State College Engineering Experiment Station wishes to acknowledge the fine spirit exhibited by the Office of Production Research and Development of the War Production Board in withholding their testing program and making the Climatometer facilities they installed in this laboratory available for the Bureau of Ships dehumidification research program. The authors are indebted to Prof. F. G. Hechler, director of the Engineering Experiment Station for the valuable counsel given during the program; and the assistance rendered by L. E. Epstein, Bureau of Ships, in developing the test procedures and securing test data. The release by the U. S. Navy Bureau of Ships of the data for publication is duly acknowledged.

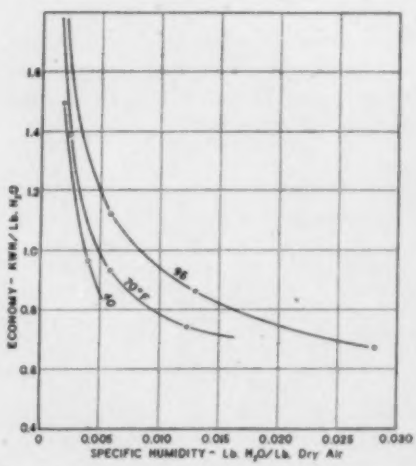

Fig. 7—Economy curves for dual bed dehumidifier

NEW LISTING OF CAST IRON RADIATORS

Printed copies of Simplified Practice Recommendation R174-47, Cast Iron Radiators, are now available, according to an announcement of the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

The original recommendation was promulgated in 1940 and revised in 1941. Both of these issues listed large tube cast iron radiators only. In 1942 the War Production Board issued an order prohibiting the manufacture of large tube radiators, and the recommendation was again revised to bring it in line with the order, which permitted only small tube radiators. Ten stock sizes were recommended.

The revised recommendation, which will be effective from January 1, 1947, retains all but one of the 10 sizes of small tube radiators previously recommended. In addition, there has been added a stock assembly schedule of these radiators. This list is based on a study which disclosed that 60 standard assemblies would take care of 90 per cent, or more, of the total demand over the country. It is expected that the adoption of the standard assembly list will place wholesalers in a position to carry stocks or radiators in greatest demand, and thereby provide more rapid turnover and cut down inventories of slow moving stocks.

Copies of Simplified Practice Recommendation R174-47, Cast Iron Radiators, may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for five (5) cents each. A discount of 25 per cent is allowed on orders of 100 or more copies.

Methods Used in Determining the Health Hazards Arising From the Inhalation of Various Chemicals

By Francis F. Heyroth,* M.D., Cincinnati, Ohio

SUMMARY—At present the trend is being established that no new compound shall be handled until its toxicologic properties have been investigated, at least to some extent. The author describes the three general methods used for establishing standards for maximum allowable concentrations of air contaminants: (1) field observations; (2) animal experimentation; and (3) human experimentation.

Introduction

KNOWING the volume of air in a given locality and the rate at which it is being contaminated by a given mist, dust or vapor, a ventilating engineer could estimate the rate of ventilation necessary to lessen the contamination to any desired limit. To set the limit which must not be exceeded, if the area is to be made safe, obviously requires a knowledge of the toxicity of the contaminant. It is the author's intention to acquaint ventilating engineers with the methods available for measuring the toxicity of air-borne contaminants, the reliability of the data secured by the various methods most frequently employed, the manner in which agreement may be reached as to the maximum allowable concentration of a given substance, and the sources of information that are available.

Brief Historical Review of the Development of Quantitative Industrial Toxicology

Prior to the past 30 to 40 years, few if any attempts were made to learn anything of the relationship between the incidence of industrial intoxication, acute or chronic, and the degree of exposure to the toxic agent to which workmen were subjected. Not until shortly after 1900 was it established that the chief agent in the causation of lead poisoning was lead-bearing dust or fume suspended in the air, and that the lung was the chief portal through which lead was absorbed. This knowledge gave rise to efforts to learn the amount and particle-size distribution of dust present in the air surrounding certain processes known to be especially dangerous, and to correlate these with the incidence of industrial poisoning. About this time a few rather crude experiments were devised in which, for an hour on each of a number of sucessive days animals were forced to breathe air contaminated to various degrees with lead dusts.

Although much effort was devoted during the next 25 years to the collection of statistics regarding the incidence of illness from exposures to various other toxic substances in industrial use, and to the clinical description of the intoxication, quantitative data relating incidence of illness to the severity of exposure which induced it were but rarely sought. In 1912, a European text on industrial poisoning made mention of such data derived from animal experimentation only in the case of benzene, carbon disulfide, chlorine and ammonia. As late as 1925, the comprehensive book by Alice Hamilton, which did much to stimulate interest in industrial intoxication, provided figures regarding the atmospheric concentrations required to induce varying degrees of intoxication in the case of fewer than 10 substances.

The importance of securing quantitative data depends upon the recently appreciated fact that any toxic substance may be absorbed up to a certain amount without inducing detectable harm. The margin between this limit and the amounts required to induce severe or fatal injury vary widely with the nature of the toxic agent.

Animal experimentation offers the only means of studying at will the effects induced by the inhalation of air bearing a toxic agent in a variety of predetermined concentrations. It offers, however, many technical difficulties, which were only gradually surmounted. Beginning about 1880, Lehmann, a German hygienist, and his students, began such investigations, studying at first the halogens, hydrogen sulfide, carbon disulfide, and a few other gases. After 1900, work of this nature was continued at Würzburg both by Lehmann and by Flury and Zernik. Sayers and others soon began such investigations at the U. S. Bureau of Mines. The industrial developments arising from the first World War stimulated others to enter this field and experience in the study of war gases led to theoretical and technical advances in the methods employed. For the most part, however, this work was limited to a study of the immediate and usually severe poisoning that results when air bearing such gases in known but relatively high concentrations is inhaled over a period of from a few minutes to an hour or so. In a relatively few instances, an effort was made to learn the maximum concentration that could be borne safely for six hours.

It is now realized that such brief experiments are quite incapable of revealing any useful information relative to the concentrations which give rise to chronic intoxication, such as might arise from the daily handling of the material in industry. One of the first investigations, in which it was sought to learn the maximum concentration in which a gas could be tolerated in the air inhaled throughout the entire working day, and on every day, was conducted by Henderson and associates in 1921-22 upon carbon monoxide, in order to learn the ventilation necessary in the Holland tunnel. At present, it is the goal of the industrial toxicologist to supply information of use in setting a standard for the concentration of a toxic substance which should never be ex-

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ceeded in the air of rooms in which men and women work. For many substances, two or more standards are needed: one so low that no harm can result even when the period of exposure extends over every working day in the year, and the other, a higher one applying only to shorter periods of exposure, such as may result from intermittent operation or from leaks in equipment. Much work on both immediate and chronic toxicity has been and is being done in university laboratories (notably at Chicago, Cincinnati and Harvard), in the laboratories of the Division of Industrial Hygiene, U. S. Public Health Service, at the Mellon Institute and elsewhere. In large part, the work is directly supported either by industry or from governmental sources. At present, data exist regarding the toxicities of well over 100 gases, vapors, dusts, fumes, and mists. These, however, are not of uniform reliability. At present the trend is being established that no new compound shall be handled until its toxicologic properties have been investigated, at least to some extent.

Methods Used in the Quantitative Evaluation of Toxicity of Air-borne Materials

In general there are three sources of data necessary for setting maximum allowable concentrations: field observations, experiments upon animals, and experiments upon man.

Field Observations

The first of these was long the only one available. It involves the correlation of the results of frequent medical examinations of the employees with data secured by analyses of the air in which they work. The use of this method has a number of serious limitations. It requires the cooperation of both chemists and physicians, each of whom must be specially trained for this work, and capable of exercising a high degree of critical judgment. The chemist may have to devise methods, sometimes microchemical, for the determination of very small quantities of a new organic substance in the air. The techniques for the enumeration of dust particles and for determining their size distribution are unfamiliar to most chemists. But it is in determining how often and where to collect the samples that the greatest judgment is needed. This requires a thorough knowledge of how and when the process is carried out, and the vagaries in it that occur from time to time, as well as of the numbers of men employed, their location with respect to the equipment, and the degree of severity of their labor. The physician must also know these facts in regard to the operating conditions if he is to distinguish the illness he may encounter from that arising from causes less intimately associated with the process in question. When the maximum allowable concentration, which it is sought to establish, is but slightly exceeded, the symptoms of intoxication are apt to be of a mild and indefinite nature, which may give rise to confusion with illness or lowered efficiency arising from such causes as poor nutrition, fatigue, unsanitary working conditions, etc. He must, therefore, know thoroughly the usual state of health of men engaged in similar operations, but not exposed to the toxic agent. In the absence of clues yielded by the other approaches (animal or human experimentation), the physician must be able to evaluate the symptoms and detect the first of the more severe and possibly characteristic signs of intoxication that may actually be attributed to the chance incidence of an excessive concentration of the substance in the air. It is obvious that the maximum allowable concentration can be determined by this procedure alone only in the event that actual intoxication has resulted on one or more occasions. One goal of modern industrial toxicology —the safe introduction of new products into industry—can obviously not be met by relying solely upon this approach. On the other hand, experience has demonstrated that the method has great value when used in conjunction with other methods involving the experimental approach.

Animal Experimentation

This offers the advantage that the new toxic agent may be studied in a large range of accurately known concentrations at will, and that the experiments may be conducted for any desired period of time from minutes to months. It also permits the demonstration of the nature of the damage which results from the absorption of the new compound. Observation of the behavior of animals during or after the period of exposure may be of great value in making clear the mechanism by which the agent acts. Examination of the tissues of animals that die during exposure or are killed after they have survived for various periods thereafter, particularly if supplemented by later microscopic examination, will often reveal which organs are most severely damaged, and show much regarding the nature of the processes by which the damage occurs. This information is of value in disclosing the type of signs and symptoms that should be looked for in the case of workmen. The knowledge that the red cells of the blood are damaged when animals are exposed to vapors of aniline shows that careful and frequent examinations should be made of the blood of workmen who handle this material. The finding of severe damage to the liver in animals following the inhalation of vapors of carbon tetrachloride suggests that those who work with this substance may be protected by subjecting them to tests designed to indicate an impairment of the function of that organ. Furthermore, animal experiments may afford a basis for the recommendation of prophylactic measures, since they have demonstrated that when adequate quantities of carbohydrates and certain amino-acids are supplied, the susceptibility of the liver to damage by some of the chlorinated hydrocarbons is lessened. This information is of direct value to the industrial physician responsible for the care of such workers, for it enables him to exclude from exposure those poorly nourished persons most prone to suffer injury, and induces him to set up means for prophylactic instruction in nutrition. Finally, a knowledge of the mechanism by which the compound induces intoxication is of value in affording a rational basis for the treatment of such cases of poisoning as may occur through accident or inadvertence.

The use of animal experimentation in setting a maximum allowable concentration has, however, certain limitations, which are inherent in the variations in the response of individuals or different species of animals to exposure. When animals of several species are exposed simultaneously to air bearing a new substance in known concentration, it frequently occurs that those of one species may survive while all those of another may die. Such experiments may, therefore, yield not one but a series of maximum

allowable concentrations, each applicable to a different species. For example, 8 of 20 mice died during a series of 20 seven-hour exposures to a stream of air bearing DDT in the dust in a concentration equivalent to 0.008 mg of DDT per liter, but guinea pigs, rabbits and cats tolerated exposures to much higher concentrations.

Wide variations in the susceptibility of animals to the inhalation of air bearing ketene gas in low concentrations occur. Mice die during or shortly after a 10 min exposure to air bearing 25 to 50 ppm by volume, but greater amounts must be present in the air to cause the death of animals of other species, the lethal concentrations being 50 to 200 ppm for monkeys, 250 to 375 ppm for rats, 375 to 500 ppm for guinea pigs, and 750 to 1,000 ppm for rabbits.

Such variations in susceptibilty make it necessary to use great caution in applying to man the quantitative data secured from the response of animals. Qualitative as well as quantitative differences have also been observed in the response of animals of various species. The inhalation of the vapor of monomethylaniline induces in rabbits a rather severe anemia, while cats do not exhibit this response, but show instead, a remarkable alteration of the appearance of the red cells, accompanied by the formation of methemoglobin. From these results alone the nature of the response of man could not be predicted. It is not possible to select in advance for experimental work any one species whose response will most closely resemble that of man. Rules based upon assumed similarities, either anatomical, biochemical or phylogenetic are of little general validity. The best that can be done at present is to employ as wide a variety of species as is feasible. In practice, rabbits, rats, mice, guinea pigs, cats, dogs and monkeys are those most commonly used.

Quantitative variation within a given species occurs both among men and experimental animals. Sex, age, genetic strain, nutritional status and the effects of the ordinary diseases that occur among animals are among the more obvious causes of such variation. It has recently been demonstrated that very young rats are at least 200 to 400 times more resistant to the administration of a given dosage of thiourea than are adults.[1] However, even when these factors are as adequately controlled as possible in the design of an experiment, there still remains a considerable variation in individual susceptibility. The capacity of an exposure chamber of a size suitable for laboratory experimentation necessarily limits the number of animals which can be used in a given experiment. Since, in determining maximum allowable concentrations, the animals must be exposed for six to eight hours daily on at least five days of each week, over a period of six months or more, replications are limited. There can be little assurance that the six to ten rabbits chosen for use in such an experiment represent a truly random sample of all rabbits available, so that the results apply strictly only to those actually used rather than to rabbits in general. The necessity for dealing with such limited numbers of observations has given rise in recent years to the development of new statistical methods that make proper allowance for such limitations.

Quantitative data may also be secured concerning the amounts of the substance that have been absorbed into the blood and tissues of the animals, when methods for its determination can be devised. Analyses of the excreta are also of value in determining the rate at which it is eliminated from the body. Many substances undergo chemical alteration during their passage through the body, and it is frequently of importance to learn the form in which they are excreted. Others are broken down to simpler products or are burned to carbon dioxide and oxygen. Accordingly, efforts are made to determine as completely as possible the fate of the substance while in the body.

Human Experimentation

Human experimentation may be desirable after a sufficient background of information has been obtained from animal experiments to make it safe. It is rarely feasible to employ this method to determine a maximum allowable concentration, since this would necessitate the daily exposure of several men over prolonged periods. It is of value as a check upon the possibility that the value arrived at on the basis of animal experimentation may be grossly in error when applied to man. A concentration somewhat higher than that believed allowable for prolonged exposure may be chosen and several men be exposed to it for periods up to two or three days. Large chambers in which certain forms of activity may be carried out have been used. Before the actual exposure, the men are given a thorough physical examination, including numerous tests of organic function and a battery of psychological tests. The examination is repeated following the exposure and any differences that may be observed are noted. Certain of the tests, especially neurological and psychological, may also be given during the actual exposure. The excreta are examined in order to learn the extent to which the substance may be eliminated from the body either as such or in altered form.

Experiments of this type are of especial value in appraising the hazards of exposure in poorly ventilated quarters and for relatively brief periods to concentrations somewhat in excess of that believed permissible for prolonged exposure. Such experiments have been recently carried out in the study of toluene, of insecticidal dusts, and of certain fluorinated compounds. In the case of toluene, for example, experiments have shown that the substance when inhaled in concentrations not injurious to bodily health, nevertheless induced a transient and slight impairment of psychic function which might interfere with the performance of certain operations, or cause lessening of judgment which under certain circumstances might increase the incidence of accidents.

The Setting of Maximum Allowable Concentrations

It is natural in publishing the results of animal or human experimental work, that an investigator should draw such inferences as he believes justified as to the maximum concentration allowable for prolonged exposure. Frequently, however, the values that have been proposed by various investigators for a given substance differ considerably and the work of each must be examined critically before a choice can be made between them. If the compound is in actual use, the results of field correlations between actual exposures and the incidence of illness may also be available for comparison.

[1] Dieke and Richter, Journal of Pharmacology, 83:195 (1945).

In recent years, several groups of workers in the field of industrial hygiene have sought to collect, appraise and correlate the clinical and experimental data that are available in regard to numerous substances. The industrial hygiene units in various state departments of health or labor have been particularly active in this field. The first list of allowable concentrations prepared in this manner after consultation with many authorities in the United States and elsewhere was that promulgated by the Massachusetts Department of Labor and Industries in 1937 which was amended and extended in 1939 and 1940. It is still carefully stated to be unofficial and intended only as a guide for the use of the Division of Occupational Hygiene in its supervisory work. This is an essential point, because it takes cognizance of the limitations of both experimental work and of actual field operations. It makes clear also that the proposed standards are tentative pending the accumulation of more data from practical human experience or from more extensive experimentation. Other official groups in New York and Utah, as well as the U. S. Public Health Service, have subsequently prepared published lists of allowable concentrations as guides for their own or other industrial hygienists. On the other hand, some states (California, Connecticut, Oregon and Ohio) have incorporated their own selections of such values into regulations or codes which have the effect of law. Unfortunately, the values set forth by these various agencies do not always agree and it is possible for a degree of atmospheric contamination that is regarded as safe in one state to be held dangerous in another. Thus, if an industrial organization were to carry on a process in similarly ventilated plants in two states, it might be subjected to legal penalty in one state for maintaining conditions that would be acceptable in the other. For example, the maximum concentration of methyl bromide regarded as permissible in California (500 ppm) is far greater than that (20 ppm) allowed in Ohio. Discrepancies between the standards embodied in legal codes or in unofficial guides of the various state departments of industrial hygiene exist in the case of at least 28 toxic substances.

This difficulty might be minimized if the authorities were to agree to adopt only such values as had been promulgated by some national recognized organization such as the industry-supported *American Standards Association*, which has a mechanism by which the pertinent data may be evaluated in an unbiased fashion through a committee of experts representing industry, insurance companies and governmental agencies. An objection that has been advanced against this procedure is that its cumbersome nature would tend to lessen the frequency with which the values might be reconsidered as new data become available. This may, however, be overweighed by the likelihood that such committees, representing as they do a wide variety of expert opinion, will be less likely to propose standards based on only a portion of the available evidence than would a more narrowly constituted local body. Since 1940, 17 such standards for dusts, gases and vapors, as well as one for X-radiation have been adopted by the *American Standards Association* as shown in Table 1. A few of these were adopted tentatively as war standards, later revision being contemplated. In the case of dusts, the units are milligrams per cubic meter of air, but gas or vapor concentrations are usually expressed as parts by volume per million of air. Standards set by other authorities are sometimes stated in terms of weight of gas or vapor per unit volume of air, as milligrams per liter. Tables for the interconversion of these values are available, the table being entered at the molecular weight of the gas. With the exception of not more than three states, the limits set by the *American Standards Association* are those generally adopted in state codes.

Table 1—Maximum Allowable Concentrations

American Standards Association

	Parts Per Million
Arsenic	(0.15[a])
Benzene (Benzol)	100
Cadmium	(0.1[a])
Carbon disulfide	20
Carbon monoxide	100
Chromic acid	0.1[a]
Formaldehyde	10
Hydrogen sulfide	20
Lead	0.15[a]
Manganese	(6[a])
Mercury	0.1[a]
Methanol (methyl alcohol)	200
Nitrogen oxides	25
Styrene monomer	(400)
Toluene (Toluol)	200
Trichloroethylene	200
X-ray	(0.1r)
Xylene (Xylol)	(200)

[a]Milligrams per cubic meter
( ) War Standards

It must be emphasized that the adoption of these or other standards does not lessen the need for careful medical supervision in all plants using dangerous chemicals. Records of actual concentrations and their fluctuations should be kept and compared with the results of frequent clinical examinations, and in some instances with data on the concentrations of the substances in the blood or excreta of the workers, or with the results of special tests for alterations of metabolism or physiological function. In some cases, ventilation and other mechanical means for the control of atmospheric contamination may be too costly or difficult, and it may be desirable to change the process to use a less toxic substance.

Sources of Information

The engineer desirous of learning the values adopted officially or semi-officially by the various states, will find them tabulated as of November, 1945, in a recent article.[2] This tabulation does not include the Ohio code, adopted in 1946, but does include those adopted by the *American Standards Association* as well as values which Cook tentatively recommended for a wide variety of materials for which neither the *American Standards Association* nor any state authority had previously proposed a standard. In any event, the engineer responsible for planning ventilation requirements would do well to consult the local state authorities to learn the requirement for the material in question. More detailed information may be sought in text or reference books.[3,4,5]

Anyone desirous of going to the original sources will find the earlier German work in the Zeitschrift für Hygiene, while much of the work done in this country since 1919, has appeared in the Journal of Industrial Hygiene and Toxicology, or in the U. S. Public Health Reports and in special bulletins issued by the Bureau of Mines or the Division of Industrial Hygiene of the U. S. Public Health Service.

[2]Warren A. Cook, *Industrial Medicine*, 14:936 (1945).

[3]Noxious Gases and the Principles of Respiration Influencing Their Action, by Henderson and Haggard. (Reinhold Publishing Corp., Second Edition, 1943.)

[4]Flury and Zernik, Schädliche, Gase Springer, Berlin, 1931.

[5]The Analytical Chemistry of Industrial Poisons, Hazards and Solvents, by Jacobs. (Interscience Publishers, Inc., New York, 1941.)

Determining and Reducing the Concentration of Air-Borne Micro-Organisms

By Matthew Luckiesh* and A. H. Taylor**, Cleveland, Ohio

SUMMARY—Bacteria and viruses regardless of their physical nature can be destroyed by suitable exposure to ultra violet energy. Very low wattages of socalled germicidal lamps outdo sunlight in germicidal effectiveness. Methods and apparatus for use in determining and reducing the concentration of air-borne micro-organisms are described. Typical concentrations of bacteria in air at various locations are given and some results of tests are included.

THERE is abundant clinical evidence that some infectious and contagious diseases are spread by air-borne bacteria or viruses[1]. These organisms may be present in any room or building occupied by persons or animals. One obvious purpose of mechanical ventilation is the reduction of the concentration of such bacteria or viruses in order to reduce the spread of disease. However, there are practical limits to the number of air-changes per hour which can be achieved satisfactorily by mechanical ventilation. Obviously, in addition to ventilation some method of destroying the air-borne organisms can be introduced. One very effective agent is radiant energy, especially that in the middle ultraviolet region, λ2000 to λ3000. The region of maximum effectiveness appears to be at approximately λ2500-λ2700.[2] As seen in Fig. 1, the lethal effectiveness decreases rapidly as the energy increases in wavelength. Notwithstanding this, sunlight, which has practically no energy shorter than λ3000, is a germicidal agent, largely because of the massive energy values and long exposures involved. However, very low wattages of socalled germicidal lamps (low-pressure mercury arcs) outdo sunlight in germicidal effectiveness.

Sources and Types of Bacteria

Many of the air-borne bacteria in occupied interiors have their origin in the respiratory systems of the occupants or may be dislodged from their clothing, bodies, etc. Dust floating in the air or stirred up from the floor carries many bacteria. Generally a large percentage of those collected from the air are harmless to human beings in the concentrations usually found, but commonly some are pathogenic.

The positive identification of colonies developed from bacteria collected from the air is a complex and tedious undertaking. In some field work by this laboratory the air was sampled in the reception room of a doctor's office while occupied by 5 to 15 patients. One petri dish, containing 108 colonies, was selected for a detailed study of types collected and 27 different types were identified. Approximately half were of possible human origin, and approximately 20 per cent of the total were potentially pathogenic.

Many micro-organisms are of such size that they can be observed in a high-power microscope. The rate of reproduction is so high that a single organism on a suitable culture medium may multiply to such a large number as to be visible without magnification in less than 24 hours. However, some types must be incubated for several days and even weeks before becoming visible.

Viruses are much smaller than bacteria and cannot be seen in the highest

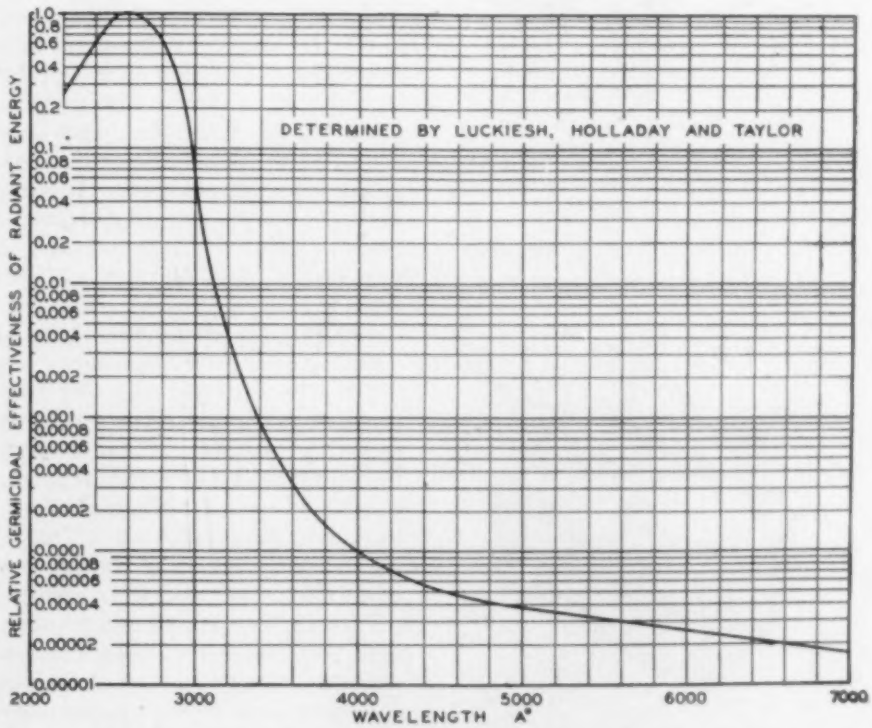

Fig. 1—Relative germicidal effectiveness of radiant energy of various wavelengths as determined with B. Coli seeded on agar plates and also in shallow dishes of distilled water

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[1]Exponent numerals refer to References.
For presentation at the 53rd Annual Meeting of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Cleveland, Ohio, January 1947.

power visual microscopes, but some types have been observed with the electron microscope. Some believe that they are living organisms, while others believe they are autocatalytic bodies capable of producing injurious action. Regardless of their physical nature, they can be destroyed by suitable exposures to ultraviolet energy.[3]

Collecting Air-Borne Micro-Organisms

Two general methods of collecting air-borne bacteria and determining their concentration are in use.[4] By passing the air through water containing a nutrient material, then *plating-out* a small amount of the water onto a culture medium and incubating it, the number of micro-organisms in a measured quantity of air may be determined. Several types of air-samplers collect the bacteria directly on a culture medium which can then be incubated for growth of the colonies. Probably the first method of air-sampling was *sedimentation* in which open petri dishes containing a suitable nutrient were exposed in the area to be studied. The bacteria collected by this method are principally those carried on the heavier particles of dust and the larger moisture droplets which are least supported by upward air drafts. Obviously this method does not yield directly quantitative values of the number of organisms in a given volume of air.

Several proposed air-samplers, notably the Wells Air Centrifuge, the Hollaender Funnel-Type Aeroscope and the Bourdillon Jet Sampler employ the principle of impingement of the air on the culture medium.[4]

The authors and their colleague, L. L. Holladay, have devised a very efficient type of sampler employing the high-velocity impingement principle[5,6,7]. One of these, designated as a *radial-jet sampler* is illustrated in Fig. 2. Only a single unit is actually necessary, but in this illustration two identical units are employed for laboratory use to study the effect produced by various variable factors such as intensity of germicidal energy, duration of exposure, humidity, etc. The petri dish containing a moist gelatin-like nutrient is placed on a metal platform which is rotated slowly by a Telechron motor. One open unit shows the petri dish in position and the closed drum, with narrow radial slit, in the lid. At an air rate of 1 cfm, air issues from the slit with a linear velocity of approximately 100 fps, thus forcefully impinging the micro-organisms on the moist culture medium. The result is a very efficient air-sampler. However, its usefulness for air-sampling outside the laboratory is limited by the need for an air pump which is necessarily heavy.

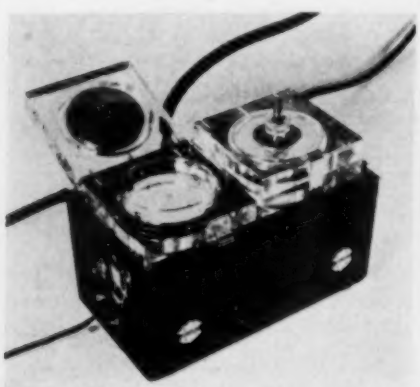

Fig. 2—Efficient type of *radial-jet* air-sampler with two identical sampling units, useful in making comparative studies

The authors have also devoted a great deal of research to the development of an air-sampler employing the electrostatic principle of impingement of air-borne micro-organisms. It was soon found that a strong electrostatic field greatly increased the efficiency of collection. A result of these researches is a portable sampler weighing less than 15 lb, illustrated in Fig. 3. Air enters each unit of the sampler at the center of a 150 deg metal cone connected to one side of a high d-c voltage, the petri dish with nutrient being placed on a metal plate connected to the other side of the high voltage. Since the carriers of bacteria in the air may be charged either positively or negatively, it is necessary to provide for the collection of both types of charged particles. This is accomplished by having two identical sampling units, in which one unit has the cone positive and the lower plate negative, while the reverse polarity is used in the other unit. Air is drawn through each unit at ½ cfm by means of a small blower located in the housing below the sampler units. Thus if the sampling period is 10 min, one unit collects the positively charged particles in 5 cu ft of air and the other unit collects the negatively charged particles in another 5 cu ft of air. The combined count on the two plates applies to 5 cu ft of air. The electrostatic field of approximately 7000 volts between the electrodes in each unit is

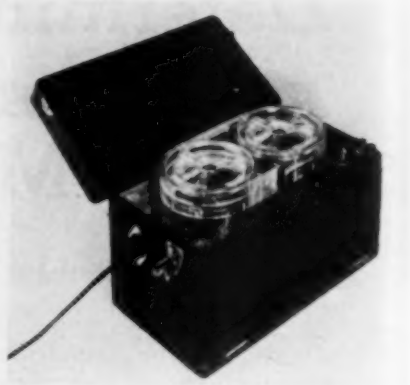

Fig. 3 — Portable duplex electrostatic air-sampler which uses standard petri dishes for the collection of air-borne bacteria

supplied by a rectifier circuit incorporated in the portable device. High resistances in the leads to the electrodes remove the hazards of dangerous electrical shocks. This device is known as the Luckiesh-Holladay-Taylor Electrostatic Bacterial Air-Sampler. Since the conical upper electrodes are also charged, they also collect bacteria. If identical bacteria-laden air enters both sampling units, it is reasonable to assume that the upper electrodes collect as many bacteria as are deposited on the petri dishes. This is taken into account in evaluating the results, since it is assumed that the sum of the catches on the two petri dishes represents the bacterial content of *one-half* the total air passing through the sampler. Careful tests indicate that the bacteria collected on the upper electrodes do not appreciably contaminate subsequent samplings. Consequently, it is generally unnecessary to sterilize or clean the sampler between samplings. Experimental evidence indicates a high efficiency of collection. It is probable that naturally air-borne bacteria sometimes occur in *clumps*. It is improbable that such clumps are broken up in the process of collection; hence only a single colony will develop upon incubation of such a clump.

Growth of Bacterial Colonies

Many types of nutrient media are commercially available, since no single medium is satisfactory for all micro-organisms. For the collection of naturally air-borne bacteria, the authors have principally used Tryptose Blood Agar (Difco). After collection, the petri dishes are incubated for approximately 48 hours at 37.5 C.

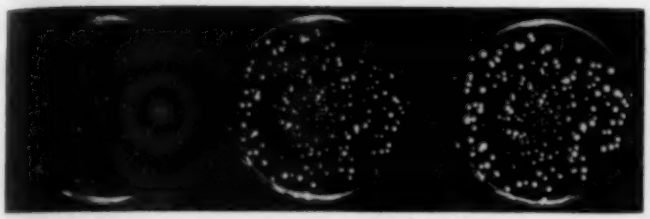

Fig. 4—Illustrating a petri dish after incubating for 24, 48 and 72 hours at 37.5 C. Organisms were collected from air in an occupied room

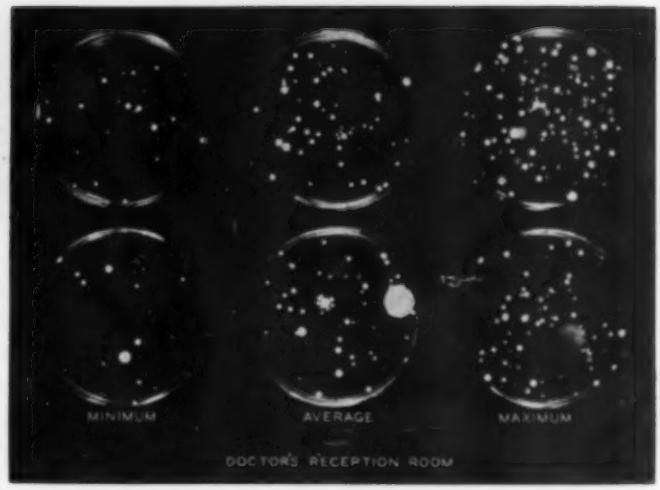

Fig. 6—Petri dishes showing colonies developed from air-borne bacteria collected in a doctor's reception room, occupied by a number of patients

the most favorable temperature for colony growth. The rate of growth in a given case is illustrated by Fig. 4 from photographs of the same petri dish after incubation periods of 24, 48 and 72 hours. The counts at 48 and 72 hours do not greatly differ, but the count at 24 hours is very much less. While the Tryptose Blood Agar is one of the best available media for growing most of the air-borne bacteria, Schneiter, Dunn and Caminita[8] of the U. S. Public Health Service have recommended Proteose Extract Agar as being superior to other media for the growth of several strains of streptococci organisms which have been suggested as indices of air pollution.

Sampling Procedure

Dust on the floor generally contains many bacteria. This fact is important to keep in mind, since variations in activity of the occupants or stirring of the air during the sampling period may greatly influence the results and lead to erroneous conclusions. For example, in the first sampling the authors carried out in a motion-picture theater, the greatest concentration of bacteria was found just prior to the showing of the first picture, while the audience was entering the theater.

In determinations of bactericidal effectiveness of an installation of germicidal lamps, the authors have obtained the most reliable results by sampling during a period of minimum or nearly constant activity. The usual method is to have the lamps turned off for several hours before beginning the sampling, and then take samples for several 10 min periods during the hour before and for at least an hour after turning on the lamps. The petri dishes are then incubated for 48 hours before counting the colonies.

Table 1—A summary of results of sampling air for bacterial content in various locations, all *without* germicidal lamps.

Location	Colonies[a] per cu ft of air	
	Max	Avg
Large cafeteria during lunch period, six days in midwinter	83	44
Theater of medium size with small volume of air per person. Part of air cooled and recirculated. Summertime	74	30
Doctor's reception room, 5 to 15 patients	47	26
Dental operating room	41	32
Hospital A		
Surgical room, just vacated and washed	-	13
Delivery room, vacant	-	15
Infants' nursery	-	18
Cafeteria	-	25
Doctors' dressing room	-	420
Five public schools, summer	134	47
Orphanage, contagion ward, 8 patients	59	44
Children's home nursery for children of pre-school age	194	135
Dairy barn	-	2500
Poultry house	-	4000

[a]All these colonies were collected and grown on Tryptose Blood Agar (Difco) nutrient.

Concentration of Air-Borne Organisms in Various Places

During a period of about 15 months the authors have sampled air in a large number of places, some with and others without germicidal installations. As a consequence, a great deal of information has been accumulated to show the concentrations encountered in various locations. Some of these data are summarized in Table 1.

Table 1 illustrates the fact that the concentration of air-borne bacteria varies greatly in various locations. It also varies quite appreciably at the same location on different days. Bacterial air-sampling is not an exact science, and unless the concentration is quite high, it appears to vary appreciably over short periods of time.

The concentration of air-borne bacteria in a cafeteria during the lunch period is illustrated graphically in Fig. 5. Samplings over 10 min

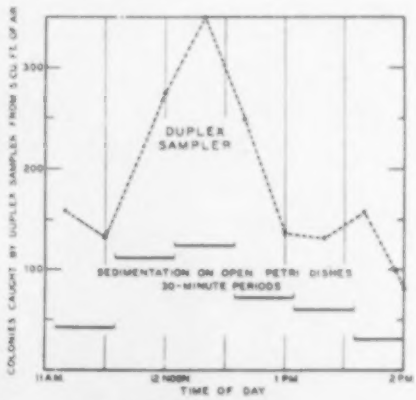

Fig. 5—Showing variation in concentration of air-borne organisms in cafeteria before, during and after period of high occupancy. Number of organisms caught in 10 min with duplex electrostatic air-sampler is compared with number caught by sedimentation on open petri dishes in 30 min periods

periods were made with the electrostatic sampler, and open dishes were exposed for sedimentation tests for periods of 30 min each. On the average over the whole sampling period, the sampler collected 7½ times as many bacteria per minute as were collected by the sedimentation plates. Obviously the electrostatic sampler yields data pertaining to the concentration of air-borne bacteria or the average number per cubic foot of air.

One of the most important possible places of infection by air-borne bacteria is the reception room of almost any doctor, where prospective patients wait for periods which may be one hour or longer. Samplings were made over a period of several hours in a reception room, with results as illustrated by the petri dishes in Fig. 6 and the data in Table 1. The sum of the colonies on the two plates in each column represents the micro-organisms collected from 5 cu ft of air. The dishes shown are representative of the minimum, average and maximum during the period of 2½ hours.

Results of Germicidal Installations

With the assistance of other members of the laboratory staff, using the procedure outlined, the authors have determined the effectiveness of germicidal lamps in a number of schools, hospitals, a dairy barn, a poultry house, etc. In some of the better installations the following results were obtained: three schools, reductions of 45, 50 and 65 per cent; dairy farm, cow barn, 55 per cent; calf barn, 70 per cent; poultry house, 75 per cent. In several cases negative results were obtained; *i.e.*, the concentration was greater when the lamps were on than when they were off. Obviously this result was due to factors which overshadowed the lethal effect of the lamps. In two schools where the tests showed the lamps to be ineffective the number of lamps installed was less than recommended[9]. In a nursery having a low ceiling the lamps were installed only about 1 ft below the ceiling. This clearance is too small for effective irradiation.

Since excessive exposures to germicidal (λ2537) energy produce erythema and conjunctivitis, (a temporary redness of the skin and irritation of the eyes), the lamps are usually installed in occupied rooms to irradiate the upper air of the enclosure above eye-level. Fortunately, very few paints used on walls and ceilings are efficient reflectors of this energy,[10] hence the energy reflected from the irradiated areas will usually be less than 10 per cent of that incident upon them. If necessary, a paint with a low reflectance can be used.

The most efficient installation will be one which concentrates the maximum amount of energy in the upper air of the room, projecting it across the room so as to produce lethal dosages throughout the volume of air irradiated. If too much of the energy strikes the ceiling the installation will be inefficient for too much of the energy will be absorbed without irradiating a large volume of air. Circulation of air in the room is essential for the irradiated upper air must return to the lower occupied region in order to reduce the concentration of organisms in the breathed air. The maximum amount of energy which can be used in an occupied enclosure is limited by the permissible intensity of reflected energy reaching the eyes of persons in the room. Tentatively the safe values appear to be 0.5 and 0.1 microwatt per square centimeter for 8 hour and 24 hour occupancy, respectively.

Air circulation greatly aids in moving the micro-organisms into the upper air where the germicidal energy can kill them. In winter the air currents produced by the heating system aid in accomplishing this. Additional means of stirring up the air might be beneficial. Obviously germicidal lamps can be installed in air-ducts in many cases.

Some air-sampling tests were made at an underground poultry house having forced ventilation. Germicidal lamps had been installed along the corner between wall and ceiling at one side of the enclosure, but were baffled so that only about one third of the floor area was irradiated. The rate of settling of dust on the floor was very high. The bacterial concentration was very high, too high for

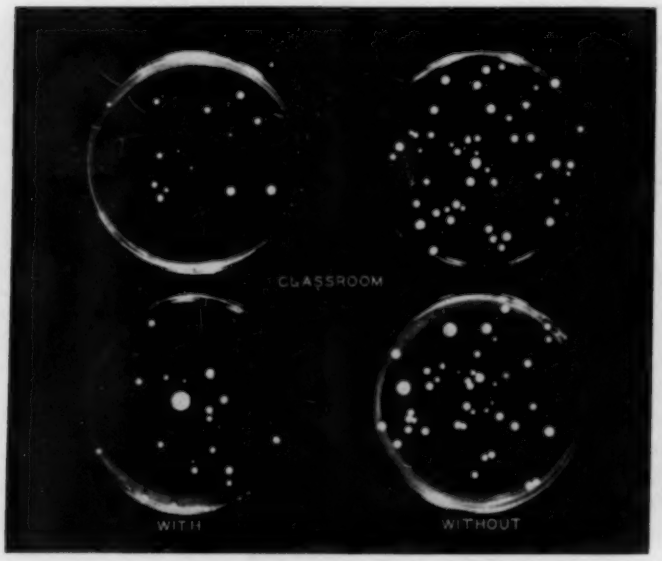

Fig. 7—Results of sampling air in schoolroom with and without germicidal lamps irradiating the upper stratum of air. Four 30 watt lamps in a room 20 ft x 40 ft with 12 ft ceiling

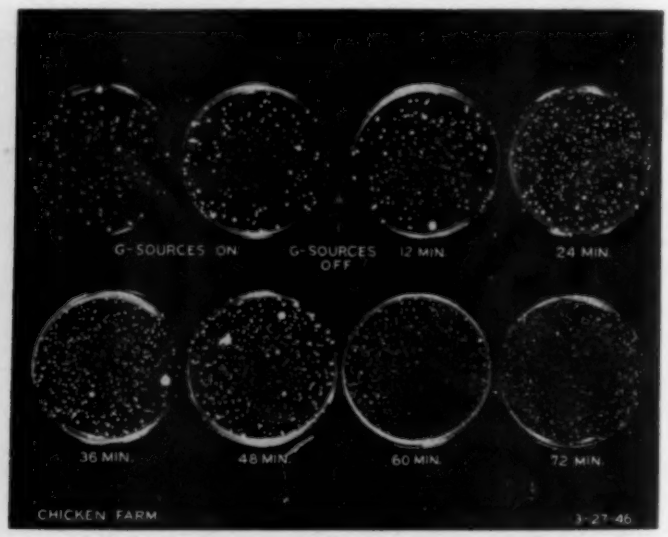

Fig. 8.—Petri dishes exposed to same volume of air in poultry house with and without germicidal lamps irradiating most of the air. Samplings after turning off lamps indicate increasing bacterial content of air

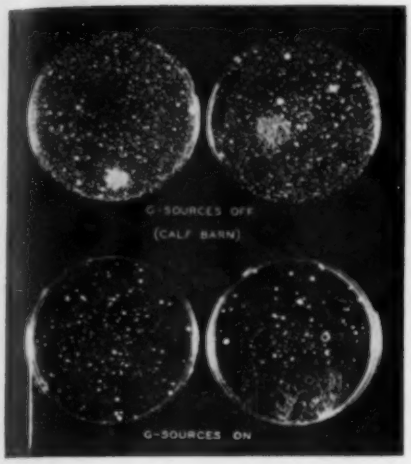

Fig. 9—Air-borne organisms in calf barn with and without germicidal lamps

satisfactory sampling. As might have been expected, the lamps did very little good, since such a large part of the floor area, with high dust and bacterial contamination, was not directly irradiated.

If germicidal lamps of adequate wattage and number are properly installed, then a worth while reduction in air-borne organisms results. This is demonstrated by Fig. 7. Fig. 8 illustrates the rate of increase of organisms in a poultry house after the germicidal lamps were turned off. The effectiveness of the lamps is quite evident. About an hour passed before the concentration of air-borne bacteria increased to an equilibrium value. Figs. 9 and 10 demonstrate quite strikingly some results achieved at a dairy farm. Since direct irradiation can be used, a greater reduction can be obtained than in schoolrooms, etc., where the irradiation must be confined to the upper part of the room.

Proper design of installations of germicidal lamps requires knowledge regarding the lethal effectiveness of the energy with various types of micro-organisms. At present, quantitative data along these lines are limited, but the authors and their colleagues are intensively studying this. For completeness such a study should include many types of organisms which are commonly air-borne. This is a large undertaking and will require considerable time. Present engineering practice can undoubtedly be improved when more complete fundamental knowledge is available.

The authors are indebted to T. Knowles for valuable assistance in the researches leading up to the development of the air-samplers, and in carrying out many of the field tests. He has also done all of the photographic work. They also gratefully acknowledge the aid of F. C. Kautzky who, for eight months, has ably assisted in the laboratory work and carried out the tests necessary for the identification of some specific colonies of micro-organisms.

References

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The Transmission of Certain Infections of Respiratory Origin, by Leon Buchbinder. (*Journal of the American Medical Association*, February 28, 1942, 718-730.)

2. Applications of Germicidal, Erythemal and Infra-red Energy, by Matthew Luckiesh. (D. Van Nostrand Co., New York, 1946.)

3. Studies of Air-Borne Virus Infections II. The Killing of Virus Aerosols by Ultraviolet Radiation, by D. G. Edward, Dora Lush and R. B. Bourdillon. (*Journal of Hygiene* 43, 1943, 11.)

4. A Comparative Study of Sampling Devices for Air-Borne Micro-Organisms, by H. G. duBuy, Alexander Hollaender and Mary D. Lackey. (Supplement No. 184 to the Public Health Reports, U. S. Public Health Service, 1945.)

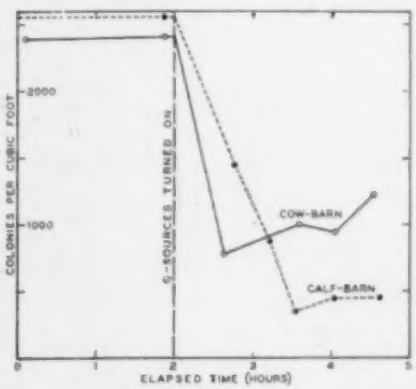


Fig. 10—Graphical illustration of effect of germicidal lamps in reducing bacteria in a dairy

5. Sampling Air for Bacterial Content, by Matthew Luckiesh, L. L. Holladay and A. H. Taylor. (*General Electric Review*, March 1946, 8-17.)

6. Catching Air-Borne Micro-Organisms, by Matthew Luckiesh and A. H. Taylor. (*The Magazine of Light*, June 1, 1946, 32-34.)

7. Sampling Devices for Air-Borne Bacteria, by Matthew Luckiesh, A. H. Taylor and L. L. Holladay. (*Journal of Bacteriology*, Vol. 52, No. 1, July 1946, 55.)

8. Studies in Connection with the Selection of a Satisfactory Culture Medium for Bacterial Air Sampling, by Roy Schneiter, John E. Dunn and Barbara H. Caminita. (U. S. Public Health Reports, Vol. 60, No. 28, July 13, 1945, 789-806.)

9. Germicidal Fixtures, Basic Design and Use, by L. J. Buttolph and Howard Haynes. (*Lamp Department Bulletin LD-15*, General Electric Co.)

10. Transmittance and Reflectance of Germicidal (λ2537) Energy, by Matthew Luckiesh and A. H. Taylor. (*Journal of the Optical Society of America*, 36, April 1946, 227)

ALLEN JOHNSON OPENS CONSULTING OFFICE

Allen J. Johnson, former director of the Anthracite Institute Laboratory, is now available as a fuels and combustion consultant with offices at 344 Congress Ave., Lansdowne, Pa., according to recent announcement.

Mr. Johnson has completed 25 years in the anthracite, oil and gas industries and is prepared to handle the investigation and promotion of both the fuel and non-fuel uses of all sizes of anthracite, together with plant and field surveys, plant betterment studies, fuel and combustion reports, and general engineering consulting work.

He was born at Smyrna, Del., and was graduated from the University of Delaware with a B.S. degree in mechanical engineering. Before joining the Anthracite Institute in 1926 he received his early training with the Atlantic City Gas Co. and the Atlantic Refining Co.

PROGRAM

53rd ANNUAL MEETING

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

HOTEL STATLER — CLEVELAND, OHIO

JANUARY 27-30, 1947

Sunday—January 26

10:00 a. m. Committee Meetings
1:00 p. m. REGISTRATION (Hotel Statler)
1:30 p. m. Council Meeting
2:00 p. m. Committee Meetings

Monday—January 27

8:30 a. m. REGISTRATION (Hotel Statler)
10:00 a. m. OPENING SESSION (Research Laboratory)
- Dedication of Research Laboratory
- Reports of Officers
- Nature of Air Flow at Suction Openings, by A. D. Brandt, R. J. Steffy and R. G. Huebscher.
- Reports of Committees
- Report of Tellers of Election

12:00 Noon Research Luncheon (Quad Hall Restaurant—7500 Euclid Ave.)
12:45 p. m. Inspection Trips:
- 1:15 p. m. Visit to Nela Park Lighting Institute
- 3:45 p.m. Visit to *AGA* Laboratory

2:00 p. m. Opening of Exposition (Lakeside Hall)
2:30 p. m. Chapter Delegates Meeting (Research Laboratory)
9:30 p. m. Operation Relaxation (Hotel Statler—Ballroom)
- Informal Musical and Comedy Program with One Act Play by Chagrin Valley Little Theater.

Tuesday—January 28

8:30 a. m. REGISTRATION (Hotel Statler)
9:30 a. m. TECHNICAL SESSION (Hotel Statler—Grand Ballroom)
- The Effect of Moisture Content on the Diffusion of Odors in Air, by Richard L. Kuehner
- Dehumidification—Methods and Applications, by John Everetts, Jr.
- Rating Dynamic Dehumidification Equipment, by E. R. Queer and E. R. McLaughlin

12:00 Noon Exposition (Lakeside Hall)
12:15 p. m. Luncheon—Guide Publication Committee
2:00 p. m. Panel and Radiant Heating Forum
5:30 p. m. Social Hour (Hotel Statler—Euclid Room)
6:30 p. m. Past Presidents' Dinner (Hotel Statler—Tavern Room)

Wednesday—January 29

8:30 a. m. REGISTRATION (Hotel Statler)
9:30 a. m. TECHNICAL SESSION (Hotel Statler—Grand Ballroom)
- Practical Considerations in Determining Human Tolerance to Heat, by Willard Machle, M.D.
- Methods Used in Determining Health Hazards Arising from the Inhalation of Various Chemicals, by F. F. Heyroth, M. D.
- Minimum Replenishment of Air for Living Spaces Under Conditions of Mechanical Cooling, by W. V. Consolazio

12:00 Noon Exposition (Lakeside Hall)
12:45 p. m. Inspection Trip:
- Visit to Laboratory of National Advisory Committee for Aeronautics

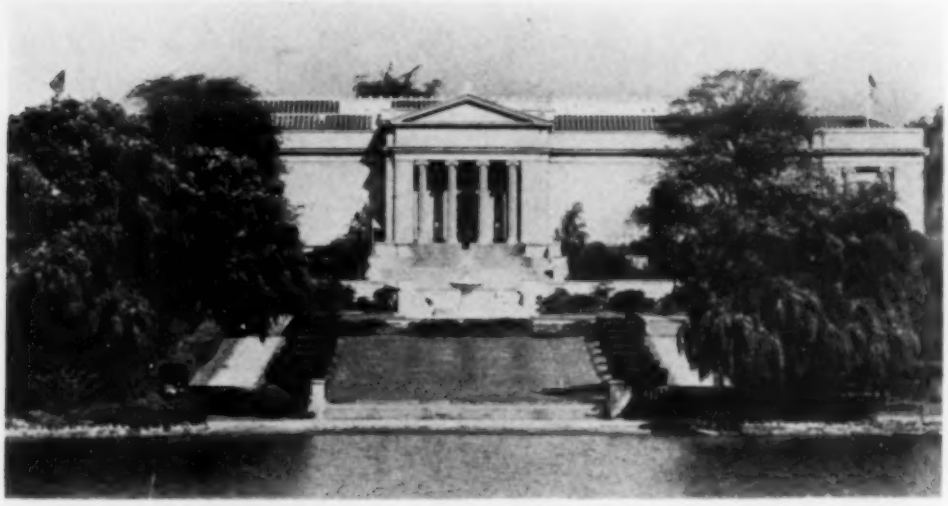
2:00 p. m. Chapter Delegates Meeting (Hotel Statler—Lattice Room)
7:00 p. m. Annual Banquet (Hotel Statler Ballroom)
- Toastmaster: L. T. Avery
- Presentation of Past President's Emblem

Thursday—January 30

9:30 a. m. TECHNICAL SESSION (Hotel Statler—Euclid Ballroom)
- Response and Lag in the Control of Panel Heating Systems, by F. W. Hutchinson
- Unfinished Business
- New Business
- Installation of Officers

12:00 Noon Exposition (Lakeside Hall)
2:30 p. m. JOINT SESSION—*National Warm Air Heating and Air Conditioning Association.*
- Proposed Design Procedure for Large, Mechanical Warm Air Heating Systems, by Prof. S. Konzo.
- Determining and Reducing the Concentration of Air-Borne Micro-Organisms, by Matthew Luckiesh and A. H. Taylor.

4:00 p. m. Council Meeting



Cleveland's Museum of Art

LADIES' PROGRAM

Tuesday—January 28

11:00 a. m. to 12:30 p. m. Visit to Nela Park Lighting Institute—An exhibit and description of modern lighting methods and equipment.

1:30 p. m. to 4:30 p. m. Luncheon and Special Style Show by Halle Brother's Co. at Stouffer's Shaker Square

Transportation by Bus:

Lv. Hotel Statler	10:30 a.m.
Ar. Nela Park	11:00 a.m.
Lv. Nela Park	12:45 p.m.
Ar. Stouffer's	1:05 p.m.
Lv. Stouffer's	4:15 p.m.
Ar. Hotel Statler	5:00 p.m.

Wednesday—January 29

10:30 a. m. Conducted Tour through Plant of Printz Biederman Co., 1971 East 61st St., manufacturer of coats and suits.

Transportation by Bus:

Lv. Hotel Statler	10:00 a.m.
Ar. Printz Biederman Co.	10:30 a.m.
Lv. Printz Biederman Co.	11:30 a.m.
Ar. Hotel Statler	12:00 noon

Thursday—January 30

No special events planned. Day left free for shopping. Cleveland Ladies' Committee will be available for recommended shopping tours and store locations.

COMMITTEE ON ARRANGEMENTS

D. L. Taze, *General Chairman*

Honorary Chairmen

L. T. Avery C. F. Eveleth G. L. Tuve

Vice Chairmen

E. B. Cary F. A. Kitchen P. D. Gayman L. S. Ries

J. M. Black, *Secretary*

Banquet—John James, Chairman; Walter Baggaley, Vice-Chairman; R. W. Dickson, Jr., D. Gladieux, D. E. Mannen, E. W. Philips.

Entertainment—R. L. Clark, Chairman; S. R. Guilbert, E. E. Maurer, L. H. Pogalies, E. J. Sable, W. B. Watterson, R. A. Wilson.

Finance—E. F. Morse, Chairman; H. W. Heisterkamp, J. F. Platz, J. A. Schurman, A. L. Vanderhoof.

Inspection—L. G. Powers, Chairman; W. M. Rowe, Vice-Chairman; K. A. Gottschalk, L. H. Jackett, W. P. Miller.

Laboratory Reception—C. M. Humphreys, Chairman; R. M. Conner, G. V. Parmelee, J. J. LaSalvia, R. F. Stamberger.

Ladies—R. H. Cutting, Chairman; Mrs. R. H. Cutting, Mrs. L. T. Avery, Mrs. P. D. Gayman, Mrs. C. M. Humphreys, Mr. and Mrs. J. P. Jones, Mr. and Mrs. W. R. Rhoton, Mrs. L. S. Ries, Mrs. Cyril Tasker, Mrs. G. L. Tuve.

Publicity—W. R. Moore, Chairman; J. A. Dahlstrom, K. T. Davis, W. E. Eynon, Alexander Galaba, B. L. Gamble, Everett W. Gray, R. A. Jack, John Richmond, W. R. Teller.

Reception—J. E. Wilhelm, Chairman; G. P. Nachman, Vice-Chairman; J. L. Foley, J. L. Frisse, C. L. Grandstaff, H. L. Repp, W. R. Rhoton, L. E. Slawson, H. E. Wetzell, H. K. Jennings, (Cincinnati Chapter), R. B. Breneman (Central Ohio Chapter).

Sessions—R. L. Byers, Chairman; E. E. Maurer, Vice-Chairman; P. M. Berry, J. C. Boehm, Jr., L. C. Burkes, H. F. Curtis, T. D. Dravage, J. K. Kinkaid, A. E. Lavelle, H. A. Tolerton.

Transportation—R. E. Sherman, Chairman; L. W. Dunbar, P. B. Fleming, J. A. Hall, C. A. McKeeman, C. R. Matthews.

Method of Choosing Location of, Financing and Conducting Meetings of the Society

Resolved: **That inasmuch as the Annual and Semi-Annual Meetings of the Society come under the jurisdiction of the Council, the following rules governing the handling of such meetings be adopted by the Council and published in the JOURNAL of the Society at least twice during every year, preferably just prior to each meeting.**

1—The Council will select the city in which the Annual or Semi-Annual Meeting is to be held, giving due consideration to the invitations received from Chapters or members as well as to the advisability of so distributing those meetings as to make them of the greatest advantage to the general membership, and to reduce as far as possible the expense of members attending.

2—That an appropriation be made to cover the entertainment or local expenses, incurred in connection with the meeting not exceeding $500.00, the regular meeting expense to be taken care of by the General Fund of the Society in the regular way.

3—That no registration fee or compulsory obligations of any nature be imposed on members or guests.

4—That the purchase of tickets for banquets or for any other form of entertainment that may be provided be entirely voluntary.

5—That the grouping of features and the sale of tickets for group features be discouraged.

6—That the raising of funds from manufacturers of heating apparatus be discouraged.

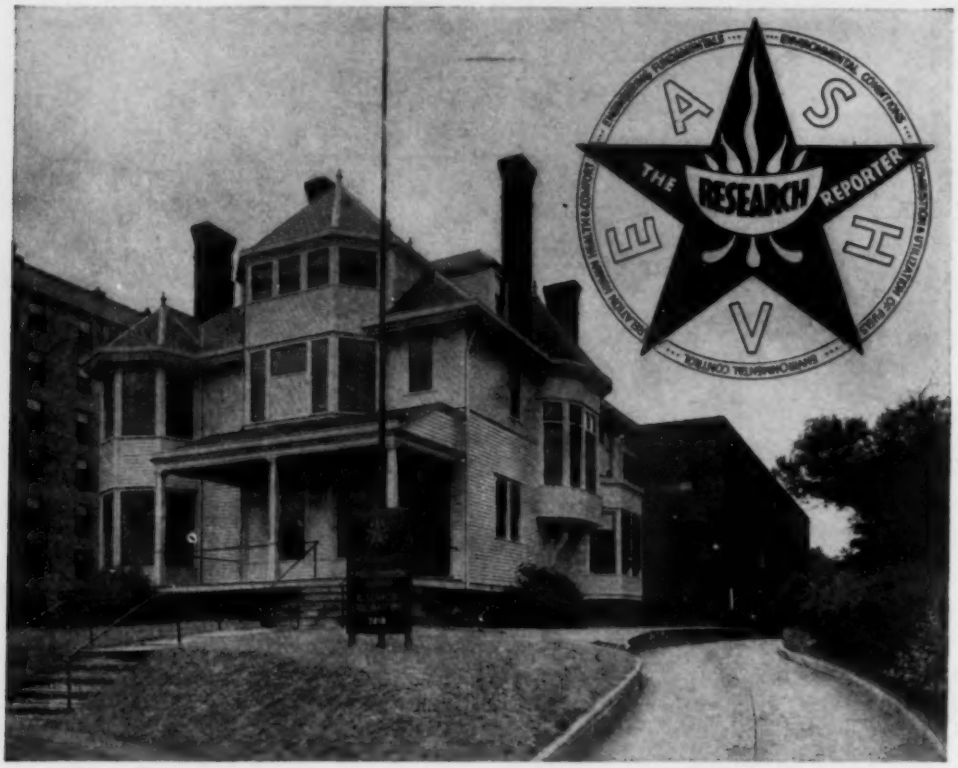
7—That the display of samples, or of literature, advertising the product of any manufacturer in any way, shape or form, be not permitted at the booths, registration desk, or in or about the meetings.

8—That the distribution of trade papers be entirely at the discretion of the committee in charge.

9—That the local Chapter or local members be empowered to form a General Committee with such sub-committees as may be required to handle the details of transportation, hotel accommodations, entertainment, finance, etc., and that this General Committee be requested to confer frequently with the Council, through the Secretary of the Society, and to make frequent reports on progress in connection with the various matters being handled by them.

10—That the arrangements of elaborate and costly entertainment features be discouraged.

Adopted at Council Meeting, January 29, 1926.



LABORATORY MORTGAGE RETIREMENT PLAN

UPON the joint invitation of the Northern Ohio and Ontario Chapters of the Society all of the Chapters are cooperating in a plan for the retirement of the mortgage on the new Research Laboratory Building in Cleveland. The project was officially started at a meeting of representatives of the Northern Ohio and Ontario Chapters in Buffalo, November 22. As a result, a joint letter from Presidents Wilhelm and Jenkinson went to all Chapter Presidents in which it was pointed out that the Society has reached an important milestone in its history, and also noted the fact that the official dedication of the Research Laboratory at 7218 Euclid Ave. would be held during the 53rd Annual Meeting, January 27.

It was thought that this occasion could be made more memorable if the outstanding mortgage could be paid off. It was felt that all of the Chapters would be interested in participating in the plan to retire the mortgage and the first announcement has been greeted with enthusiasm. The spontaneous action taken by the Chapters has indicated a definite interest in research activities and Chapters that already have their campaigns underway are New York, Philadelphia and Connecticut.

The sponsoring Chapters have suggested that it would be appropriate to eliminate the mortgage if the Chapters would act to obtain voluntary contributions from their members or allocate something from their treasuries. The suggestion was made, with the full knowledge that each Chapter would participate in accordance with its ability and that no Chapter should feel that there was any competition involved, nor should any member consider his personal participation as an assessment.

The Officers of the Society have expressed their full support of the plan and President Offner addressed a letter to all Chapter Presidents on November 29 expressing the belief that all members will want our Laboratory "free and clear by the first of next year."

In the belief that all members of the Society should have the opportunity to participate in the elimination of the mortgage a message from the President has been mailed to all members of the Society under date of December 14.

STACEY REJOINS CARRIER

Alfred E. Stacey, Jr., air conditioning pioneer and one of the seven founders of Carrier Corp., Syracuse, N. Y., rejoined that organization December 1, according to an announcement by Arthur P. Shanklin, vice-president and general sales manager. Mr. Stacey, who has just returned from active duty in the United States Navy with the rank of captain, will be process consultant to the sales division and in this capacity, he will devote major attention to the application of temperature and humidity control to industry.

A graduate of Syracuse University in 1906 with an M. E. degree, Mr. Stacey has been active in the design, development and application of air conditioning and refrigeration equipment throughout his entire career. He became associated with Dr. Willis H. Carrier at the Buffalo Forge Co. upon graduation and when the Carrier Air Conditioning Co. of America was organized in 1908, Mr. Stacey became chief engineer. In 1915, he was one of the seven founders of the Carrier Engineering Corp. After five years as Western manager, he became chief research engineer, which position he occupied from 1919 to 1930. When Carrier Corp. was formed in 1930, he became vice president in charge of engineering.

Mr. Stacey has made many notable contributions to the development of air conditioning and refrigeration including:

Basic developments of low pressure, high boiling point refrigerants, which were required in the development of centrifugal refrigeration equipment.

The invention of apparatus for the control of temperature and humidity in drying processes.

Development of the "Weathermaster" system of air conditioning.

Design of the first practicable pre-cooler for Pullman cars.

Development of the first successful steam ejector water-cooler unit for air conditioning.

In addition to these and other inventions which resulted in the issuance of 35 patents to Mr. Stacey, he designed many industrial and comfort air conditioning installations including that in the United States Capitol.

A. E. Stacey, Jr.

In 1935, Mr. Stacey left Carrier to organize the firm of Buensod-Stacey, Inc., which engineered many important air conditioning installations in the New York metropolitan area, including various buildings in Rockefeller Center.

Mr. Stacey's active duty in the Navy began in November, 1940, when he was assigned to the Bureau of Ships. After serving in the Pacific, he returned to continental United States in May, 1942, and worked on the production of landing craft, being responsible for expediting material for LCI's, LST's, LSM's and DE's required for invasion operations in both the Atlantic and Pacific. He was promoted to the rank of Captain in July, 1942, and was assigned to the Brooklyn Navy Yard and made director of the Navy's Materials Testing Laboratory. During his Naval service, Captain Stacey made contributions to the improvement and design of naval vessels of such importance that the military effectiveness of certain classes of vessels, including submarines in particular, was materially increased. He was placed on inactive duty July 15, 1946.

A leader in his profession, Mr. Stacey in January 1946 was awarded the F. Paul Anderson Medal, highest award of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, the presentation being made by Dr. Willis H. Carrier, chairman of the board of Carrier Corp., in New York.

A prominent member of the ASHVE, Mr. Stacey is the 1947 nominee for the office of second vice president. He joined the Society in 1914 and since that time has served on many of its committees. He served two three-year terms as a member of the Committee on Research and as its chairman for two years, during which time he served as an ex-officio member of the Society's Council. He also served on numerous Research Technical Advisory Committees. His first affiliation in the Society was with the Illinois Chapter when he served as its secretary from 1916-1919.

Mr. Stacey is also a member of a number of scientific groups, including the *American Society for the Advancement of Science, Acoustical Society, American Society for Testing Materials,* and *American Society of Naval Engineers.*

In returning to Carrier Corp., Mr. Stacey is carrying on the development of the air conditioning and refrigeration industry in association with three others of the seven founders of the Company, Dr. Willis H. Carrier, chairman of the board; Edward T. Murphy, senior vice president and Logan L. Lewis, vice president and technical consultant.

BORNSTEIN ANNOUNCES OPENING

William Bornstein, partner in Wm. Bornstein and Son, plumbing and heating contractors, and member of the ASHVE, announces the opening of the company's own building at the corner of 2nd and Kennedy Sts., N.W., Washington, D.C. The building houses a showroom featuring a complete display of plumbing and heating equipment and is now open for inspection.

DRAFTING STANDARD PRINTED

The new American Standard for Drawings and Drafting Room Practice, Z14.1-1946, (revision of Z14.1-1935) is now available in printed form. The late D. S. Boyden, past president of the Society, was the Society's representative on the *ASA* Sectional Committee which prepared this standard.

The standard is obtainable from the *American Standards Association,* 70 East 45th St., New York 17, N. Y., or from the *American Society of Mechanical Engineers,* 29 West 39th St., New York 18, N. Y., at $1.25 per copy.

SUMMARY OF LOCAL CHAPTER MEETINGS*

ATLANTA—November 8. Subject: The Climatic Hangar at Eglin Field, Florida, Speaker: Willis D. Ludwig, construction engineer, York Corp., Philadelphia, Pa. He discussed the temperature, humidity, pressure, insulation and vapor seal features of this $5,500,000 Army Air Corps project. It was evident from the discussion that followed that Mr. Ludwig's talk was of considerable interest. Other Features: Spencer Boyd, chairman of the nominating committee, submitted the slate of officers for the coming year as follows: H. King McCain, president; L. L. Barnes, vice president; Leo Sudderth, Jr., secretary; G. R. Bilderback, treasurer; W. J. McKinney, M. M. Crout, board of governors. Attendance 77. Attendance ratio 0.39.

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CENTRAL NEW YORK—November 13. Subject: A Gas Industry and Its Relationship to Central New York State Requirements. Speaker: H. W. Hayward, manager of Building Heating Sales, Central New York Corp. Mr. Hayward presented an interesting description of the gas industry, its early history, its importance in war production, and its future as a growing industry. He explained the network of gas lines which bring natural gas to various communities, and storage of gas in old fields in summer to meet peak demands in winter. He also discussed the problems involved in laying the gas line from Texas to western Pennsylvania and New York and pointed out that its service to Syracuse was of particular interest to engineers and residents of that area. An interesting question and answer period followed. Attendance 47.

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CENTRAL OHIO—November 18. Subject: Solar Problems in Air Conditioning. Speaker: L. T. Avery, president, Avery Engineering Co., Cleveland, Ohio. By means of pictures and charts shown on slides, Mr. Avery clearly presented the problem that the solar load causes in air conditioning. Other Features: J. E. Wilhelm, president, Northern Ohio Chapter, and vice president and chief engineer, Avery Engineering Co., spoke briefly on the campaign to be sponsored by the Northern Ohio Chapter to liquidate the mortgage on the new ASHVE Research Laboratory in Cleveland. Attendance 48. Attendance ratio 0.47.

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CINCINNATI—November 12. Subject: Reverse Cycle Refrigeration Combined with Radiant Heating as Applied to Small Homes. Speaker: Carl F. Boester, housing research director, Purdue Research Foundation, Purdue University, Lafayette, Ind. Mr. Boester described in detail some of the research on small houses that has been conducted at Purdue and discussed the application of the heat pump to the heating and cooling of these houses. A rising vote of thanks was given to Mr. Boester. Other Features: Prior to the business meeting preceding the talk, the members met at Wright Field, Dayton, where they were conducted on an interesting and informative inspection of the Field. The group saw the testing laboratories for engines, carburetors, radiators and heat exchangers, and superchargers, and the mechanical equipment which serves these laboratories, the new super-sonic wind tunnel which is now being installed, a number of planes, including B-29s and P-80s, and other features of the Field. At the business meeting Pres. A. W. Edwards read the proposed amendment to Article IV of the Constitution and it was moved and seconded that the amendment be adopted. President Edwards expressed his appreciation to the Dayton members, Messrs. C. T. Doudican, G. L. Leupold and P. H. Weitzel, for their excellent work in arranging the details of this meeting. Attendance 115.

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CONNECTICUT—November 20. Subject: Society's Research—Present Program and Future Possibilities. Speaker: Cyril Tasker, director of research, ASHVE Research Laboratory, Cleveland, Ohio. Pres. P. D. Bemis expressed the wholehearted thanks of everyone to Mr. Tasker for his interesting address. Attendance 44. Attendance ratio 0.31.

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DELTA — November 22. Subject: Current Developments in Radiant Heating. Speaker: Paul S. Park, A. M. Byers Co., Pittsburgh, Pa. He gave an interesting illustrated talk and invited questions from the floor. A lively and friendly discussion followed for some time that added much to the enjoyment of the meeting. Attendance 48.

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GOLDEN GATE—November 6. Subject: Reverse Cycle Air Conditioning. Speaker: Frank Jordan, manager franchise sales, Pacific Coast Division, B. F. Sturtevant Co., Division of Westinghouse Electric. Mr. Jordan's talk was accompanied with a sound slide film on the self-

An Invitation to Members

The Council wishes to encourage authors to contribute good technical papers for presentation to our Society, particularly papers dealing with new or novel developments. Good papers on air conditioning of all kinds and new papers on air distribution, industrial hygiene and industrial ventilation are of interest. A special committee has been appointed to secure papers. The membership of the Committee on Technical Papers is composed of G. L. Tuve, chairman; L. T. Avery, Walter Heibel, C. H. Flink, and Cyril Tasker.

Any one of the committee members will be glad to consult by mail or otherwise with authors to predetermine whether the particular subject is desired.

Papers must be presented first to the Publication Committee for approval for publication and then are passed on to the Meetings Committee for selection to use at the Annual or Semi-Annual Meetings. We need papers planned now to take care of the Semi-Annual Meeting in June, 1947. If you have any papers you would like to suggest, please communicate with any of the committee members.

*Note. The attendance ratios shown represent the membership attendance divided by the chapter membership. These ratios will be useful as a partial indication of interest shown by local chapter members in various types of subjects programmed by the various chapters and may be useful in deciding on subjects for chapter meetings.

contained reverse cycle unit. A discussion of advantages and disadvantages of this cycle followed the talk. Pres. Gayner extended the Chapter's appreciation to the speaker, and announced that the subject at the next meeting would be on radiant heating and its control. Attendance 69. Attendance ratio 0.65.

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INDIANA—November 22. Subject: Recent Developments in Automatic Temperature Control Equipment for Air Conditioning Systems. Speaker: Rex Vernon, assistant secretary and sales promotion manager, Johnson Service Co., Milwaukee, Wis. Other Features: Pres. T. R. Davis gave a brief talk on attendance and I. W. Cotton spoke on chapter membership. President Davis referred the proposed amendment to the Constitution and By-Laws to C. H. Hagedon, chairman of the legislative committee, and to S. E. Fenstermaker, past president of the Chapter. The members were then asked by President Davis to check over the present State Code and to give any suggestions for its improvement to him. Attendance 36.

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IOWA—December 9. Subject: Diagnosing and Correcting Corrosion Troubles in Steam Heating Systems. Speaker: Leo F. Collins, chemical engineer, Detroit Edison Co., Detroit, Mich. Mr. Collins pointed out that the most common causes of corrosion in steam heating systems are carbon dioxide, free oxygen and caustic soda. He also stated that heating and ventilating engineers can diagnose the ordinary corrosion troubles in steam systems. Mr. Collins answered numerous questions from the floor. This was the first talk of this type the Chapter has had and great interest was evident in the subject. According to the report by the secretary of the Iowa Chapter this was considered one of the most instructive and valuable meetings held by the Chapter. Other Features: A report was given by C. A. Wheeler on future programs. Pres. E. O. Olson read a communication from the Canadian Chapter in reference to contribution by members or by chapters to pay off the indebtedness on the Society's Research Laboratory in Cleveland. Attendance 27.

IOWA—November 4. Subject: Bright Spots and Blind Spots in ASHVE. Speaker: Prof. George L. Tuve, second vice president of the ASHVE, and Case School of Applied Science, Cleveland, Ohio. Professor Tuve first discussed the Society and its membership and outlined briefly the Society's facilities for research, the various problems they are handling, and the objects of the Society. Professor Tuve then talked on air flow under free flow into occupied spaces. Professor Tuve touched on all phases and his talk was concluded with an interesting open forum discussion on the various problems in air distribution and air handling. Other Features: E. O. Olson, president of the Chapter, was elected as delegate to the Annual Meeting in Cleveland and C. A. Wheeler was selected as alternate. Attendance 30.

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KANSAS CITY—December 2. Subject: Radiant Heating and Forced Hot Water Heating. Speaker: Harold A. Lockhart, chief engineer, Bell and Gossett Co., Chicago, Ill. He illustrated his talk with slides and an active question and answer period followed. Other Features: Pres. S. L. Furber appointed the following committee to cooperate with the City on smoke abatement and fuel conservation: E. K. Campbell, chairman; N. W. Downes, T. C. Cheasley, S. C. McCann, David Caleb, J. M. Arthur, Jr., and L. W. Millis. Henry Nottberg, Jr., gave his report as treasurer. Attendance 68.

KANSAS CITY—November 4. Subject: Radiant Heating. Speaker: I. E. Brooke, consulting engineer, Chicago, Ill. He traced the development of radiant heating up to the present time and explained clearly what radiant heating is and what it should do. Mr. Brooke demonstrated many practical applications and it was apparent from his talk that he had many years of experience in the radiant heating field. A discussion followed. Attendance 71.

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MASSACHUSETTS—November 19. Subject: Controls for Radiant Panel Heating. Speaker: John E. Haines, president, Minnesota Chapter, and manager, Commercial Control Sales, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. An interesting discussion followed the conclusion of Mr. Haines' address. Attendance 65. Attendance ratio 0.88.

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MEMPHIS—November 18. Subject: Gas Operations. Speaker: Major Thomas H. Allen, Memphis Light, Gas and Water Division. Pres. R. H. Hoshall thanked the Major on behalf of the Chapter for his interesting talk and also thanked the chairman of the meetings committee, E. E. Scott, for his efforts in arranging the meeting. Other Features: Secretary Bevil read a proposal to amend the By-Laws and the amendments offered were met with the unanimous consent of the members present. Attendance 21. Attendance ratio 0.59.

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MICHIGAN—November 11. Subject: Radiant Heating. Speaker: S. R. Osborne, project engineer, Chase Brass and Copper Co., Waterbury, Conn. Mr. Osborne illustrated his talk with slides showing the application of radiant heating to various types of buildings. His talk was well received and an interesting and spirited discussion followed. Other Features: Following the report of the treasurer, A. E. Knibb, chairman, program committee, announced future meetings. G. D. Winans reported on the activities of the Affiliate Council, and J. H. Spurgeon reported as chairman of the membership committee. R. F. Connell reported on the Chapter Delegates Meeting in Montreal and in addition to his verbal report Mr. Connell turned over a written report to Pres. F. R. Bishop. Attendance 249. Attendance ratio 1.68.

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MINNESOTA—November 4. Joint meeting with *ASRE*. Subject: Reverse Cycle Refrigeration Combined with Radiant Heating as Applied to Small Homes. Speaker: Carl F. Boester, housing research director, Purdue Research Foundation, Purdue University, Lafayette, Ind. He presented several slides to show some new installations and research apparatus. An interesting discussion followed. President Haines welcomed the Minnesota Chapter of the *ASRE* and introduced the officers. Attendance 140. Attendance ratio 0.84.

MONTREAL—November 18. Subject: Anthratube. Speaker: H. A. Holbrooke, Anthracite Institute, Buffalo, N. Y. An interesting discussion followed Mr. Holbrooke's talk, which brought out many important facts regarding this new development in the heating field. The speaker explained that this unit, which he stated was a combination stoker, forced combustion heating unit, has been carefully studied with a view to capturing some of the low cost housing programs in the United States. He further explained that it was primarily for domestic use near the coal mining districts and/or short rail hauls from these sections of the country. Mr. Holbrooke emphasized that the Anthracite Institute has developed only the idea or theory and that independent manufacturers will design their own models. C. A. Booth thanked the speaker for his presentation, which was well received. Attendance 71.

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NEBRASKA—November 7. Subject: Free Flow of Air, Hot or Otherwise. Speaker: Prof. G. L. Tuve, second vice president of ASHVE, and Case School of Applied Science, Cleveland, Ohio. After an interesting talk, which he illustrated with slides, Professor Tuve spoke on the activities of the ASHVE, showing the progress of the 38 chapters during the years since the organization, and on THE GUIDE as a text book. A discussion followed. Attendance 31.

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NORTH TEXAS—November 18. Subject: Current Developments in Radiant Heating. Speaker: Paul S. Park, A. M. Byers Co., Pittsburgh, Pa. He delivered an interesting talk on the various radiant heating systems installed throughout the country. The discussion that followed was a tribute to the presentation. Other Features: E. T. Gessell, chairman, nominating committee, announced the selection of the 1947 officers as follows: C. R. Gardner, president; B. S. Foss, Jr., vice president; G. A. Linskie, secretary-treasurer; and E. J. Stern, M. L. Brown, L. S. Gilbert, board of governors. The secretary read an interesting tabulation on the year's attendance which showed that Messrs. Foss, Gardner and Poythress had attended every meeting during the year and six other members have attended all but one of the 1946 meetings. Attendance 84.

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NORTHERN OHIO—November 11. Subject: Use of Triethylene Glycol both as a Dehumidifying and Germicidal Agent. Speaker: F. K. Green. Other Features: Mr. Dearth, of the Council on World Affairs, reviewed current events relating to the United Nations. A recommendation by the nominating committee to fill a vacancy on the board of governors was presented by Walter Baggaley, who suggested W. M. Rowe. The recommendation was approved unanimously. Pres. J. E. Wilhelm then reviewed current developments relating to a plan for reducing the mortgage on the Society's Research Laboratory. After a short discussion, W. R. Moore made the following motion which was unanimously approved: The Northern Ohio Chapter goes on record in favor of retirement of Research Laboratory mortgage through personal voluntary subscription or individual chapter participation and in offering this plan, the Northern Ohio Chapter is willing to obligate itself to a donation of a minimum of $1,000.00 for this purpose. Attendance 63. Attendance ratio 0.40.

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OKLAHOMA—December 9. Subject: Diffusers for Air Distribution. Speaker: V. Floyd Self, Anemostat Corporation of America, New York, N. Y. A demonstration of equipment and a general discussion followed. J. H. Carnahan reported on the membership. Attendance 32.

OKLAHOMA—November 21. The meeting was devoted to a motion picture of the Oklahoma A. and M. and Tulsa University football game. Attendance 24.

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ONTARIO—December 2. Subject: Solar Heating. Speaker: Prof. F. W. Hutchinson, Mechanical Engineering Department, Purdue University, Lafayette, Ind. Other Features: Pres. V. J. Jenkinson announced the following as Ontario Chapter Delegates for the Cleveland Meeting: D. A. Stott, delegate with E. G. Spall, alternate; William Philip as second alternate. H. D. Henion made an appeal to the Chapter on behalf of the Research Fund. He has also launched an active campaign to raise funds from the Ontario Chapter members to help pay off the mortgage on the Society's new Research Laboratory, Cleveland. Attendance 124. Attendance ratio 0.35.

ONTARIO—November 4. Subject: The Post War Era—A Challenge to Heating and Air Conditioning Engineers. Speaker: Alfred J. Offner, president of the ASHVE and consulting engineer, New York, N. Y. Following an interesting discussion a rising vote of thanks was extended to President Offner on behalf of the Ontario Chapter members. Attendance 95. Attendance ratio 0.42.

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OREGON—November 13. Subject: Technology Tomorrow. Speaker: Dr. Baldwin M. Woods, first vice president of the Society, and director, University Extension, University of California, Berkeley, Calif. John F. Collins, Jr., treasurer of the Society, Pittsburgh, Pa, introduced Dr. Woods. Dr. Woods' talk was most interesting and enlightening. It included the results of records kept over a period of 50 years of inventions and the effect upon industry. The results, he stated, clarify future trends and indicate the tremendous opportunities for development. He explained that inventions of automatic machinery enable a man to be trained for its operation in a few weeks, instead of serving several years of apprenticeship learning a trade. A discussion followed long after the meeting was officially adjourned. Other Features: J. Donald Kroeker, chairman of the legislative committee, announced that the city of Portland may finance the cost of preparing a new warm air heating code. He also stated that the city has requested the proper procedure and recommended that it allot $5,000.00 for engineering fees. A motion was made and carried that Pres. W. Bruce Morrison consult with the legislative chairman of the Portland *Warm Air Heating Association* and formulate suggested plan of procedure. Attendance 50.

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PACIFIC NORTHWEST — November 12: Technology Tomorrow. Speaker: Dr. Baldwin M. Woods, first vice president of the Society, and director, University Extension, University of California, Berkeley, Calif. He emphasized the need for the heating and ventilating engineer to keep pace with the future trends in building con-

struction. He also gave a very interesting resumé of his experience with the new cyclotron at the University of California. Attendance 42.

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PHILADELPHIA—November 14. Subject: Society Research—Present Program and Future Possibilities. Speaker: Cyril Tasker, director of research, ASHVE Research Laboratory, Cleveland, Ohio. A few remarks were added by John A. Goff, dean, Towne Scientific School, University of Pennsylvania, and J. Stanley Morehouse, dean of engineering Villanova College. Attendance 84. Attendance ratio 0.69.

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PITTSBURGH—November 11. Subject: Society Research—Present Program and Future Possibilities. Speaker: Cyril Tasker, director of research, ASHVE Research Laboratory, Cleveland, Ohio. He spoke of the future possibilities in regard to better housing, better and safer working environment, greater comfort, control of industrial hazards with less fatigue, improved heating, better ventilation and cleanliness in the home, office and factory. He showed slides to illustrate various points, which were of great interest to his audience. Attendance 30. Attendance ratio 0.37.

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ROCKY MOUNTAIN—December 4. Subject: Diagnosing and Correcting Corrosion Troubles in Steam Heating Systems. Speaker: Leo F. Collins, chemical engineer, Detroit Edison Co., Detroit, Mich. An interesting question and answer period followed. Other Features: The membership and program chairmen submitted their reports. Attendance 39.

ROCKY MOUNTAIN—November 6. Subject: Bright Spots and Blind Spots in ASHVE; Free Flow of Air—Hot and Otherwise. Speaker: Prof. George L. Tuve, second vice president of ASHVE, and Case School of Applied Science, Cleveland, Ohio. Professor Tuve presented a highly informative talk regarding the subjects, which he illustrated with slides. Other Features: B. H. Spurlock, Jr., reported on the membership, and John Mahan reported for the program committee. H. J. Woehlke submitted the treasurer's report. Attendance 32.

ROCKY MOUNTAIN—October 2. Subject: Problems of the Architect as Related to Heating and Ventilating Design. Speaker: Robert Fuller, architect, Denver, Colo. Pres. F. L. Adams expressed thanks to Mr. Fuller for his very interesting talk. Other Features: Following the reports of the various committees, President Adams announced the selection of the nominating committee as follows: G. L. Bradbury, B. A. Brickham, W. M. Larimer, J. H. McCabe and D. J. McQuaid. Attendance 40.

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ST. LOUIS—November 7. Subject: The Role of Research in Industry. Speaker: Clyde A. McKeeman, assistant to the president of the Society, Cleveland, Ohio. He pointed out that while industry formerly was started by some individuals conceiving a new way or new method of doing something, and going into business to market their invention, today research laboratories are maintained by all large companies, and most contributions to the betterment of industry and industrial products are the results of discoveries in these research departments. He strongly recommended the support of the Society Research Laboratory by those who were interested in the heating, ventilating and air conditioning industry. His talk was thoroughly enjoyed and at the completion of his talk several interesting questions were brought up. On behalf of the St. Louis Chapter, Pres. B. C. Simons thanked Mr. McKeeman and then turned the meeting over to the president of the Engineers' Club, Mr. Smith, who also expressed his appreciation to Mr. McKeeman. Attendance 44.

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SOUTH TEXAS—November 20. Subject: Current Developments in Radiant Heating. Speaker: Paul S. Park, A. M. Byers Co., Pittsburgh, Pa. Mr. Park gave a very constructive talk, illustrating with slides of the installations in various buildings. Many questions were asked and answered on the subject, and Mr. Park received an ovation of great length. Other Features: Pres. B. P. Fisher called on E. J. Stern, president of the North Texas Chapter, to make announcements of the forthcoming Annual Meeting of the Society in Cleveland. C. R. Gardner, vice president of the North Texas Chapter, also commented on the plans for the Annual Meeting. President Fisher announced the appointment of the research committee as follows: C. A. McKinney, chairman; L. B. Quinby and H. C. Will. W. E. Long, professor of mechanical engineering, A. and M. College, gave a short talk on the activities at the College. Attendance 15.

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SOUTHERN CALIFORNIA—November 13. Subject: The Future of Electrical Power in Los Angeles. Speaker: Edgar L. Kanouse, transmission system engineer, Bureau of Power and Light, Los Angeles. Mr. Kanouse explained how planning could estimate the ultimate growth of the Los Angeles area based on the available water supply and using a rate of 165 gal per capita, and taking into consideration the past rate of growth, the ultimate estimated population for this area would be 6,250,000 people by the year 2020. He further explained how estimating requires a forecast of commercial, industrial and domestic growth. He also pointed out how requirements could be met and accurate predictions made by reviewing every 10 years the past power requirements. He explained the difficulties and problems involved in making such predictions and illustrated with slides the types of charts and graphs that are involved in making these predictions. Attendance 37.

SOUTHERN CALIFORNIA—October 14. Subject: The Post War Era—A Challenge to Heating and Air Conditioning Engineers. Speaker: Alfred J. Offner, New York, N. Y., president of the Society. President Offner's talk was devoted mainly to prefabricated homes and the use and flexibility of panel heating. He prefaced his speech with some comments about the ASHVE, relative to the purchase of the Research Laboratory and the general research program. He pointed out that the research program is being backed financially by industry, not as charitable contributions, but for valuable information that is obtainable through this research program. Other Features: A. V. Hutchinson, secretary of the Society, also had some interesting information to offer, advising that approximately $800,000 had been spent for research during the past 25

years. He also called attention to the fact that the Southern California Chapter is now next to the largest chapter in the Society, New York being the largest. Attendance 81.

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UTAH—December 6. Subject: Diagnosing and Correcting Corrosion Troubles in Steam Heating Systems. Speaker: Leo F. Collins, chemical engineer, Detroit Edison Co., Detroit, Mich. Mr. Collins pointed out that the first step to be taken in eliminating corrosion is to diagnose the trouble. He further stated that corrosion prevention includes treatment of metals, treatment of steam or treatment of condensate. He also stated that in connection with the treatment of metals it was found that tin coating the inside of condenser tubes greatly reduced corrosion. He illustrated his talk with slides and the interest in his talk was demonstrated by the interesting question and answer period that followed. Other Features: Vice president Earl Gritton welcomed the guests and announced to the members that the formal dedication of the Society's new Research Laboratory would take place on January 27th during the Annual Meeting in Cleveland. Attendance 43. Attendance ratio 0.53.

UTAH—November 6. Subject: The Factors Affecting the Efficient Utilization of Coal in the Boiler Plant. Speaker: J. H. Heath, combustion engineer, *Utah Coal Operators Association.* Mr. Heath related the history of the development of coal in Utah and outlined proper methods of coal storage in bins to prevent spontaneous combustion, stressed the importance of proper boiler room equipment layout for convenience of coal handling, and emphasized the importance of proper furnace design and adequate draft to insure the complete and smokeless combustion of coal. Mr. Heath also covered in some detail, the application of overfire air jets to coal fired boilers, with particular reference to their successful use in locomotive fire boxes. At the conclusion of his talk, he answered numerous questions. Other Features: Following the reading of the minutes of the previous meeting, and the routine Chapter business, Pres. J. T. Young, Jr., pointed out that it was essential that proposers and seconders should be prompt in returning questionnaires received from Society headquarters on applicants for membership. It was suggested that the secretary of the chapter keep a list of endorsers and seconders for each applicant and follow up on each to insure prompt handling of applications. Attendance 18. Attendance ratio 0.43.

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WASHINGTON, D. C.—November 13. Subject: Reverse Cycle Refrigeration combined with Radiant Heating as Applied to Small Homes. Speaker: Carl F. Boester, Lafayette, Ind., housing research director, Purdue Research Foundation, Purdue University. He illustrated his talk with slides and a lengthy discussion followed. Attendance 93. Attendance ratio 0.55.

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WESTERN MICHIGAN—November 4. Subject: Industrial Dust Control. Speaker: John Kane, chief engineer, Industrial Division, American Air Filter Co., Louisville, Ky. He delivered an interesting talk, complete with slides. He pointed out that ordinary street dust usually ran from 1 to 5 grains per 1,000 cu ft. Dust from industrial processes, he stated, often ran from 250 to 25,000 grains per 1,000 cu ft; therefore, collectors and other equipment, he stated, had to be specially designed to handle this dust load. The need of proper air cleaning devices is becoming more apparent, the speaker stated, due to the fact that plants have been throwing more and more dirt into the atmosphere outside their plants due to the installation of better exhaust systems inside the plants. The efficiency of different types of collectors was discussed thoroughly in the interesting discussion that followed Mr. Kane's address. A vote of thanks was extended to the speaker on behalf of the Western Michigan Chapter members. Other Features: After the reading of the October minutes, the treasurer submitted his report. O. D. Marshall reported he was still working on the Archives but there was still a good deal of work to be finished. Vaughn Hill reported that Pres. J. W. Miller was home from the hospital following an operation and was recuperating very rapidly. Attendance 80.

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WESTERN NEW YORK—November 18. Subject: Control of Radiant and Panel Heating. Speaker: John E. Haines, vice president, Minneapolis - Honeywell Regulator Co., Minneapolis, Minn., and president of Minnesota Chapter of the Society. He lectured in considerable detail on the subject of radiant heating and accompanied his talk by slide projections concerning data compiled upon the subject. Other Features: Pres. Herman Seelbach called on F. A. Moesel, Buffalo, N. Y., who spoke a few minutes on the Technical Society Council of the Niagara Frontier, and its purpose in coordinating the activities of all the local technical societies. Attendance 69.

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WISCONSIN—November 18. Subject: Fans, Sound Levels and Selections. Speaker: T. A. Walters, director of research, American Blower Co., Detroit, Mich. Mr. Walters discussed in detail the basic principles of sound measurements, including the definitions of the standard terms used in sound level measurements. He also discussed the standard test set ups for performance and sound level of fans. He gave a complete description of various fan characteristics, including slides showing curves for multiblade, high speed and vane-axial types of fans. A rising vote of thanks was given to Mr. Walters. Other Features: M. W. Bishop announced the plans for the forthcoming meetings. Pres. E. W. Gifford announced the appointment of F. J. Nunlist as Chapter Delegate, and J. R. Vernon as Alternate, to the Annual Meeting in Cleveland. President Gifford also announced that Ernest Szekely had been elected president of the Engineers' Society of Milwaukee and that M. W. Bishop had been nominated for the Society's Council. Attendance 63.

WISCONSIN—October 21. Subject: Practical Value in an Engineering Magazine. Speaker; C. M. Burnam, Jr., Editor, Heating, Piping and Air Conditioning, Chicago. Mr. Burnam discussed in detail the various phases of preparing and editing a technical magazine in order to best meet the needs of the readers, not only for the present, but also for the future. Mr. Burnam outlined the important factors in preparing material for a technical magazine. Attendance 43.

CANDIDATES FOR MEMBERSHIP

The Constitution of the Society, as now amended, requires the following mode of procedure in voting on applicants for membership in the Society. All applications for membership are to be sent to the Secretary and the names of applicants and their references shall be printed in the next issue of the JOURNAL of the Society or sent to the members in other approved manner as ordered by the Council. When replies are received from references, the Candidate's application shall be submitted to and acted upon by the Committee on Admission and Advancement as soon as possible.

When the Committee on Admission and Advancement has acted favorably upon a Candidate's application and assigned his grade, the Council shall vote upon the election of the proposed Candidate for membership by letter ballot. During the past month 109 applications for membership have been received and the names of these men and their sponsors are published in the following list.

Members are requested to scrutinize the list with care. The Committee on Admission and Advancement, and in turn, the Council, urge members to assume their share of responsibility of receiving these candidates into membership by advising the Secretary promptly of any whose eligibility for membership is in any way questioned.

All correspondence in regard to such matters is strictly confidential, and is solely for the good of the Society, which it is the duty of every member to promote.

Unless objection is made by some member by February 5, 1947, these candidates will be balloted upon by the Council. Those elected to membership will be notified by the Secretary immediately after election.

ABENDROTH, HAROLD F., Temp. Control Sales Engr., Johnson Service Co. PROPOSERS: Joseph Philippi, M. F. Mattingly. SECONDERS: Harry Hoffman, C. W. DeLand.

ANDERSON, G. A. M., Pres., The King Co. PROPOSERS: F. .B Rowley, A. B. Algren. SECONDERS: B. F. McLouth, F. F. Lange *(Advancement)*

BAILEY, FRANK T., Vice-Pres. & Gen. Mgr., Register & Grille Manufacturing Co., Inc. PROPOSERS: A. J. Offner, J. W. McGuire. SECONDERS: G. J. Sweeney, H. J. Ryan.

BAK, STANLEY J., Sales Engr., The Crosbie Co. PROPOSERS: A. W. Nugent, J. M. Osborne. SECONDERS: E. R. Kent, C. W. Porter.

BARNES, JOHN G., JR., Engr., Natkin & Co. PROPOSERS: S. L. Furber, K. M. Stevens. SECONDERS: Emil Hass, Jr., Henry Gould.

BARON, ARNOLD E., Student, Texas A & M College. PROPOSERS: W. E. Long, L. S. Hopper. SECONDERS: C. W. Crawford, Carl Files.

BERNHARDT, RAYMOND J., Mech. Engr., U. S. Army Engineers. PROPOSERS: E. A. Dillender, R. W. Barnes. SECONDERS: G. R. Rhine, F. C. Benham, Jr.

BEVAN, JOHN H., Draftsman, The Trane Company of Canada, Ltd. PROPOSERS: A. M. Dion, G. E. Cole. SECONDERS: J. L. Neilans, H. M. Treleaven.

BIGGS, RICHARD A., Dvlpt. Engr., Pittsburgh-Corning Corp. PROPOSERS: R. H. Heilman, V. Sanders. SECONDERS: E. H. Reismeyer, Jr., E. C. Smyers.

BRADFIELD, WILLIAM W., JR., Sales Engr., Wilson-Brinker Co. PROPOSERS: W. W. Bradfield, S. H. Downs. SECONDERS: H. A. Brinker, R. W. Wilson.

BROMBERG, SIDNEY, Supt. of Constr., Straus-Frank Co. PROPOSERS: Robert Salinger, D. M. Robinson. SECONDERS: C. C. Quinn, J. T. Davis.

BROWN, EDMUND P., Engr., Joseph Davis. PROPOSERS: Herman Seelbach, Jr., F. J. Weber. SECONDERS: W. R. Seelbach, B. C. Candee.

BRYAN, LLOYD W., Partner, Rocky Mountain York Co. PROPOSERS: G. D. Maves, P. H. Wright. SECONDERS: E. J. McEahern, H. S. Heyse.

CAMPBELL, SIMON, Chief Tech. Draftsman, Musgraves & Co. (Dublin) Ltd. PROPOSERS: W. J. Gowdy*, W. J. Weatherup*. SECONDERS: J. H. Harris*, K. R. Plowright*.

CILACIYAN, ARA, Student, University of Minnesota. PROPOSERS: A. B. Algren, F. B. Rowley. SECONDERS: B. F. McLouth, E. F. Snyder.

CORR, FRANK J., Engr. & Partner, Air-Flo Heating Co. PROPOSERS: W. M. Wallis, R. E. LeRiche. SECONDERS: E. J. Rosen, M. N. Musgrave.

CRANE, ROBERT M., Student, Texas A & M College. PROPOSERS: J. S. Hopper, W. E. Long. SECONDERS: C. W. Crawford, Carl Files.

CROUSE, MARION E., Student, The David Ranken Jr. School of Mechanical Trades. PROPOSERS: J. T. Lynch, G. B. Rodenheiser. SECONDERS: George Myers, H. C. Sharp.

DALY, JOHN D., Sales Engr., A. F. Hinrichsen, Inc. PROPOSERS: A. F. Hinrichsen, C. W. Hartmann. SECONDERS: J. E. O'Neill, V. J. Cucci.

DARLING, JOHN W., Sales Engr., Ontario Plumbing & Heating Supplies, Ltd. PROPOSERS: H. B. Jenney, William Philip. SECONDERS: D. J. Macdonald, G. H. Hopper.

DELANY, WILLIAM F., Chief Draftsman, The Trane Company of Canada, Ltd. PROPOSERS: A. M. Dion, G. E. Cole. SECONDERS: J. L. Neilans, H. M. Treleaven.

DILL, EDWARD F., Sales Engr., Minneapolis-Honeywell Regulator Co. PROPOSERS: R. C. Cushing, C. L. Peterson. SECONDERS: D. I. Murphy, Karl Baldwin, Jr.

DZIOBA, DONALD D., Draftsman, The Trane Company of Canada, Ltd. PROPOSERS: A. M. Dion, G. E. Cole. SECONDERS: J. L. Neilans, H. M. Treleaven.

EDGARTON, LEWIS S., Prof. Engr., PROPOSERS: F. W. Armbruster, Earl C. Parker*. SECONDERS: Herman Martin*, R. C. Braden*.

ENDO, HIDEO, Mech. Engr., R. E. Hattis. PROPOSERS: R. E. Hattis, M. B. Cook*. SECONDERS: E. P. Senk, Warren Lippitt.

FAUST, HAROLD G., JR., Sales Engr., Crane Co. PROPOSERS: H. C. Smith, C. L. McMichael. SECONDERS: C. V. Werner, W. E. White.

GAVELEK, WILLIAM A., Engr. & Partner, Elmer Gylleck & Associates. PROPOSERS: C. R. Kuglin, C. M. Burnam, Jr. SECONDERS: C. E. Price, O. J. Prentice.

GELLERT, LOUIS W., Sanitary & Htg. Engr., Shaw, Naess & Murphy. PROPOSERS: M. J. Bamond, A. O. May. SECONDERS: C. R. Kuglin, S. S. Sommerfield.

GLANZ, EDWARD F., Estimator & Asst. Engr., Glanz & Killian Co. PROPOSERS: W. H. Old, M. B. Shea. SECONDERS: G. H. Tuttle, E. D. Sheley.

GOANS, JOHN W., Knoxville Utilities Board. PROPOSERS: E. W. Roy, E. O. Hull. SECONDERS: R. R. Kegarise, M. H. Muse.

GOOTE, MARINUS, Sales Engr., Boot & Co. PROPOSERS: T. D. Stafford, J. L. Alexander. SECONDERS: J. D. Wilson, M. C. Evert.

GRETTON, JOHN D., Mech. Designer, Department of Public Works. PROPOSERS: A. F. Edwards, M. S. Woollard. SECONDERS: H. H. Angus, M. F. Thomas.

GRIECO, ALFONSO V., Chief Draftsman, Carrier Corp. PROPOSERS: R. V. D. Dunne, P. W. Armspach. SECONDERS: M. Giannini, A. J. Offner.

GRUENDEL, WILLIAM C., Htg. Sales Engr., McKee Plumbing Supply Co. PROPOSERS: Harold Bergman, R. L. Byers. SECONDERS: E. E. Maurer, G. P. Nachman.

HAUSLER, WALTER, Owner & Mgr., Institute of Heat Economy. PROPOSERS: M. H. Kliefoth, Rudolf Kuhlmann. SECONDERS: J. W. McBurney, A. C. Fieldner.

HILL, EDWARD, JR., Cons. Mech. Engr., Franklin, Kump & Falk. PROPOSERS: R. C. Cushing, D. I. Murphy. SECONDERS: T. J. White, E. C. Cooley. *(Advancement)*.

HILTON, JOHN H, Co-Owner, H. W. Lancaster & Sons, PROPOSERS: A. T. Bevil, C. S. Fischer. SECONDERS: C. E. Wynn, J. B. Lammons.

HORSBURGH, BALFOUR, J., Branch Mgr., Johnson Service Co. PROPOSERS: Leo Garneau, Aylmer Hamlet. SECONDERS: A. B. Madden, S. W. Salter. *(Advancement)*.

HOSS, ABE N., Sales Engr., Portland General Electric Co. PROPOSERS: C. W. Brissenden, J. B. Banks. SECONDERS: R. C. Chewning, T. H. McClung.

IZARD, LOUIS W., Sales Engr., Reeves Wiedeman Co. PROPOSERS: D. M. Allen, William Ball. SECONDERS: W. E. Howarth, W. L. Cassell.

JACOBS, ROBERT H, Appl. Engr., Minneapolis-Honeywell Regulator Co. PROPOSERS: J. S. Locke, E. W. Gifford. SECONDERS: G. D. Kingsland, E. J. Geistenberger.

JOHNSON, PAUL H., Student, Graduate School of Business, PROPOSERS: C. M. Humphreys, T. F. Rockwell. SECONDERS: G. G. Waters, D. L. Taze.

JOHNSON, RICHARD W., Sales Mgr., Republic Heaters Co. PROPOSERS: R. T. Haley, H. C. Mills. SECONDERS: R. M. Balch, Jr., B. F. McLouth.

JOHNSON, SIGURD O., Sales Engr., Buffalo Forge Co. PROPOSERS: H. S. Johnson, W. R. Heath. SECONDERS: C. C. Cheyney, W. J. Rothenbach.

JOHNSON, WALTER R., Chief Engr., Nickey Brothers, Inc. PROPOSERS: W. A. Danielson, E. K. Campbell. SECONDERS: J. J. Nolan, R. P. Campbell.

JUNGMANN, EDWARD C., Mech. Engr., Mead and Hunt. PROPOSERS: George Hall, C. H. Amundson. SECONDERS: B. M. Kluge, H. W. Schreiber.

KEENEY, WATSON S., Student, Texas A & M College. PROPOSERS: W. E. Long, J. S. Hopper. SECONDERS: C. W. Crawford, Carl Files.

KENNEDY, WILLIAM F., Sales Engr., Bethlehem Steel Co. PROPOSERS: C. L. Chase, H. H. Bond. SECONDERS: H. Y. Alt, A. J. Offner.

KING, TRAVIS D., Student, Texas A & M College. PROPOSERS: W. E. Long, J. S. Hopper. SECONDERS: Carl Files, C. W. Crawford.

KOTHE, ROBERT B., Service & Installation Engr., Minneapolis-Honeywell Regulator Co. PROPOSERS: E. T. Clucas, B. C. Simons. SECONDERS: James Barry, Jr., H. C. Sharp.

KRESH, STANLEY, Engr., & Vice-Pres., James H. Martin, Inc. PROPOSERS: R. W. Cummings, J. E. Schecter. SECONDERS: Ernst Graber, A. J. Offner.

LANKOW, RICHARD P., Branch Mgr., Johnson Service Co. PROPOSERS: B. W. Farnes, J. P. McDermott. SECONDERS: T. E. Taylor, W. B. Morrison.

LEGRAND, IRVING F., Mgr. & Partner, Air Engineers. PROPOSERS: R. H. Smiles, W. A. Bornemann. SECONDERS: M. E. Barnard, E. H. Dafter.

LEIGHTON, ALEXANDER H., Branch Mgr., Ilg Electric Ventilating Co. PROPOSERS: Scott Whitnah, C. T. Lawrence. SECONDERS: B. F. McLouth, R. T. Haley.

LINIGER, RUDY H., Mfrs. Repr., Larry Harrington Co., Inc. PROPOSERS: R. E. LeRiche, E. T. Eastwood, SECONDERS: E. F. Riley, C. W. May.

LOEFFLER, FRANK X., Jr., Sales Engr. & Secy., Loeffler-Greene Supply Co. PROPOSERS: F. X. Loeffler, Sr., W. M. Carroll. SECONDERS: E. W. Gray, J. H. Carnahan.

LOVE, J. EDWIN, Plant Engr., RCA Victor Division, PROPOSERS: D. R. Holt, R. S. Mizener. SECONDERS: J. O. Kirkbride, H. M. Parent.

MACDONALD, EDMUND L., Jr., Mgr., S. Cunard & Co., Ltd. PROPOSERS: A. B. Madden, S. W. Salter. SECONDERS: A. F. Hamlet, E. H. Terrance.

MARSHALL, JAMES E., Sales Engr., Minneapolis-Honeywell Regulator Co. PROPOSERS: R. C. Cushing, C. L. Peterson. SECONDERS: G. M. Simonson, N. A. Melnick.

MARTIG, ROBERT W., Vice-Pres., Farnes & Martig, Inc. PROPOSERS: J. D. Kroeker, W. B. Morrison. SECONDERS: J. H. Bonebrake, B. W. Farnes.

MARTIN, KENNETH E., Branch Mgr., American Blower Corp. PROPOSERS: Carl Clegg, O. J. Smith. SECONDERS: Verne Simmond, B. G. Peterson.

MATHERS, WILLIAM, Partner, Mathers-Curl & Associates. PROPOSERS: R. B. Jackson, I. B. Hutchison. SECONDERS: R. D. Ashley, R. S. Curl.

MCCUTCHEON, DAVID C., Mgr., Htg. & Air Cond. Div., The Crosbie Co. PROPOSERS: A. W. Nugent, J. M. Osborne. SECONDERS: E. R. Kent, C. W. Porter.

MCKIM, PHILIP H., Mech. Engr., Mehring & Hanson Co. PROPOSERS: A. W. Nugent, J. M. Osborne. SECONDERS: E. R. Kent, C. W. Porter.

MOORHEAD, ROBERT C., Engr., General Heating & Air Conditioning Corp. PROPOSERS: W. R. Sinish, J. D. Pressler. SECONDERS: L. R. Barton, E. H. Hattersley.

MURRAY, FRANCIS A., Vice-Pres., The Powers Regulator Co. PROPOSERS: A. J. Offner, D. A. MacWatt. SECONDERS: P. B. Gordon, W. L. G. Lester.

NELSON, ARTHUR N., Mech. Engr., Monroe Bowman & Associates. PROPOSERS: M. J. Bamond, C. M. Burnam, Jr. SECONDERS: C. E. Price, O. J. Prentice.

NELSON, CHARLES E., Sales Repr., Johnson Service Co. PROPOSERS: M. F. Rather, Joe Wheeler, Jr. SECONDERS: A. A. Bearman, H. J. Ryan.

NOLAN, THOMAS J., Salesman, Wesix Electric Heating Co. PROPOSERS: C. W. Brissenden, T. H. McClung. SECONDERS: E. R. Lokey, J. P. McDermott.

PARK, JAMES A., Htg. & Vent. Engr., U. S. Rubber Co. PROPOSERS: H. E. McCarl, Dermid McLean. SECONDERS: J. W. Snyder, L. G. Parrott.

PARKER, TRAVIS S., Student, Texas A & M College. PROPOSERS: J. S. Hopper, W. E. Long. SECONDERS: C. W. Crawford, Carl Files.

PLASS, RAYMOND B., Chief Engr., Ray Oil Burner Co. PROPOSERS: J. I. Sprott, C. E. Bentley. SECONDERS: G. M. Simonson, R. C. Cushing.

QUEENIN, MARTIN A., Engr., Edward E. Ashley. PROPOSERS: H. H. Bond, J. Wheeler, Jr. SECONDERS: A. W. Hinrichsen, A. J. Offner.

RASMUSSEN, A. A., Assoc. Prof., University of Houston. PROPOSERS: I. A. Naman, J. E. Hoff. SECONDERS: J. H. Dinsmore, M. L. Ray.

RAY, SYLVAN E., Student, Texas A & M College. PROPOSERS: J. S. Hopper, W. E. Long. SECONDERS: C. W. Crawford, Carl Files.

RIDDLE, J. ELMER, Mgr., Mech. Dept., Pacific Electrical & Mechanical Co. PROPOSERS: Roderick Lynch, R. C. Cushing. SECONDERS: D. I. Murphy, James Gayner.

ROGERS, WALTER M., Sales Engr., Thermal Products Co. PROPOSERS: J. L. Frisse, J. E. Wilhelm. SECONDERS: Dennis Boggs, J. M. Black.

ROTHENBACH, WALTER J., Sales Engr., John J. Nesbitt, Inc. PROPOSERS: H. S. Johnson, C. W. A. Steinmetz. SECONDERS: S. A. Chambers, H. B. Hedges.

SALZER, ALFRED R., Jr., Cons. Mech. Engr. PROPOSERS: W. H. Grant, Jr., L. V. Cressy. SECONDERS: F. G. Burns, J. S. Burke. *(Advancement)*

SANDSTED, PETER F., Gen. Mgr., Pan-L-Heat Corp. PROPOSERS: W. R. Norte, T. E. Taylor. SECONDERS: J. D. Kroeker, J. H. Bonebrake.

SCHAAR, MARTIN, Owner, Wisconsin Furnace Co. PROPOSERS: F. J. Nunlist, Jr., M. L. Lavorgna. SECONDERS: N. E. Hill, O. J. Ress.

SCROGGS, FRANK M., Sales Mgr., City Fuel Oil & Coal Co. PROPOSERS: J. F. McIntire, W. J. McKinney. SECONDERS: G. B. Hightower, R. G. Woodall

SCHWIND, LEWIS M., Dist. Repr. Minneapolis-Honeywell Regulator Co. PROPOSERS: E. E. Scott, Ralph Hughes. SECONDERS: A. T. Bevil, W. F. Slater.

SELBY, STEPHEN A., Jr., Project Engr., Chase Brass & Copper Co. PROPOSERS: S. R. Osborne, R. W. Sidbury. SECONDERS: C. L. L'Hommedieu, Winfield Roeder.

SHAFER, HOWARD S., Branch Mgr., American Blower Corp. PROPOSERS: Carl Clegg, R. G. Dolan. SECONDERS: W. W. Frankfurt, J. H. Carnahan.

SHATALOFF, NICHOLAS S., Engr., Buensod-Stacey, Inc. PROPOSERS: A. E. Stacey, A. C. Buensod. SECONDERS: J. C. Rose, H. L. Janet.

SHELDON, HERBERT P., Vice-Pres., Harry F. Haldeman, Inc. PROPOSERS: C. S. Anderson, F. L. McDonald. SECONDERS: W. O. Stewart, R. A. Lowe.

SHORBA, MICHAEL, Design Engr., Bryant Gas Heating Co. PROPOSERS: R. M. Stewart, H. C. Mills. SECONDERS: R. T. Haley, B. F. McLouth.

SMITH, EMMETT A., Exec., Southern Heater Co., Inc. PROPOSERS: Frank Graham, F. G. Burns. SECONDERS: J. S. Burke, W. P. Oster.

SMITH, ROBERT W., Pres., Robert W. Smith & Co., Ltd. PROPOSERS: A. B. Madden, John Colford. SECONDERS: C. E. W. Watson, Aylmer Hamlet.

SORENSEN, EDWARD, Mech. Designer, Keller & Gannon. PROPOSERS: F. L. Nemec, D. F. Owens. SECONDERS: R. C. Cushing, Karl Baldwin.

SPENCER, SCOTT A., Engr., Edward E. Ashley. PROPOSERS: H. H. Bond, J. Wheeler, Jr. SECONDERS: A. J. Hinrichsen, A. J. Offner.

STEIN, SAMUEL C., Student, University of Illinois. PROPOSERS: S. Konzo, W. N. Espy. SECONDERS: N. A. Buckley, R. W. Roose.

UEBERRHEIN, W. H., Partner, Pacific Electric Sales Co. PROPOSERS: W. B. Morrison, T. H. McClung. SECONDERS: R. C. Chewning, G. H. Risley.

VAN SPRIELL, LEWIS, Gen. Mgr., Wierenga Bros. PROPOSERS: F. C. Warren, T. D. Stafford. SECONDERS: W. W. Bradfield, H. D. Bratt.

VIA, JAMES H., Sales Engr., Creamery Package Manufacturing Co. PROPOSERS: C. V. Werner, C. L. McMichael. SECONDERS: C. W. Via, H. H. Wright.

WARD, WALTER E., Sales Engr., Johnson Service Co. PROPOSERS: A. W. Cooper, J. J. Johnson. SECONDERS: H. W. Marshall, B. A. Brickham.

WARE, JOSEPH H., JR., Engr., Southern Bell Tel. & Tel. Co. PROPOSERS: H. K. McCain, S. W. Boyd. SECONDERS: D. B. Stevenson, Jr., F. W. Bull.

WARNER, IRA J., Student, Texas A & M College. PROPOSERS: J. S. Hopper, W. E. Long. SECONDERS: C. W. Crawford, Carl Files.

WEIANT, ANDREW S, Mgr., McPherson Furnace & Supply Co. PROPOSERS: A. E. Finlay, G. H. Risley. SECONDERS: E. R. Lokey, W. B. Morrison.

WHITAKER, KENNETH L., Mgng. Dir., The Bristol Fan Co. PROPOSERS: D. I. Vickery*, F. R. Hodgkins*. SECONDERS: F. J. Seymour*, J. F. Terrett*.

WILD, HARRY, Tech. Engr., Atmospheric Control Ltd. PROPOSERS: Walter Yates, Sydney Holt*. SECONDERS: J. C. Metcalfe*, R. S. Hadlow*.

WILDER, WENTWORTH, Indus. Sales Engr., York Corp. PROPOSERS: R. C. Smith*, George Myers. SECONDERS: E. F. Edwards*, H. E. Miller*.

WOOLCOCK, EDWIN, *Owner*, Woolcock Plumbing & Heating Co. PROPOSERS: J. J. Lander, S. W. Strouse. SECONDERS: Herman Seelbach, Jr., J. E. Haines. (*Advancement*).

WRAY, HUBERT L., Office Engr., Dan J. McQuaid Engineering Service. PROPOSERS: D. J. McQuaid, J. H. McCabe. SECONDERS: B. A. Brickham, A. W. Cooper.

WURTS, HENRY H., Designer, Meadon's Blower & Pipe Works, Inc. PROPOSERS: Rudolf Kuhlmann, C. H. B. Hotchkiss. SECONDERS: Wesley Burden*, C. M. Shapiro*.

WYBLE, JEROME B., Design Engr. & Draftsman, William K. Karsunky. PROPOSERS: W. K. Karsunky, W. L. Norrington. SECONDERS: J. J. Nolan, Jr., W. H. Kemp.

YEAZEL, GEORGE D., Sales Mgr., Wholesale Equipment Corp. PROPOSERS: F. J. Dean, Jr., Carl Clegg. SECONDERS: P. C. Leffel, S. L. Furber.

YOUNG, PAUL W., Htg., Engr., C. A. Crosta, Inc. PROPOSERS: J. H. Singleton, G. D. Maves. SECONDERS: J. F. Mohan, J. D. Willoughby.

CANDIDATES ELECTED

In the past issues of the JOURNAL of the Society the names of the following men were listed as Candidates for Membership. The membership grade of each Candidate has been assigned by the Committee on Admission and Advancement and balloted upon by the Council. We are now instructed by the Council to post herewith, as required by Art. B-III, *Section* 8, of the By-Laws, the following list of candidates elected:

Members

BINNS, ARTHUR J. H., Owner, F. J. Baynes, Ltd., London, England.

CAMPIA, OSCAR J., Partner, Hayden Harding & Buchanan, Boston, Mass.

COOGAN, JOHN T., Engr., Mellish & Murray Co., Chicago, Ill.

COOPER, W. B., Chief Engr., Advanced Refrigeration Co., Cincinnati, Ohio *(Advancement)*.

CORNWALL, CHARLES C., Engr., The Bahnson Co., Winston-Salem, N. C. *(Advancement)*.

CROSBY, HENRY S., Dir. of Plant Engrg., General Mills, Inc., Minneapolis, Minn.

EDGINGTON, FREDERICK A., Engr. & Supt., Schmidlin Bros. Heating Co., Toledo, Ohio.

ENTENMANN, WERNER O., Research Engr., Battelle Memorial Institute, Columbus, Ohio.

FENNER, EVERETT M., Owner, Scientific Engineering Co., Centredale, R. I. *(Reinstatement)*.

HOAR, ROGER S., Hd., Legal & Patent Dept., Bucyrus-Erie Co., South Milwaukee, Wis.

LEVINE, SAMUEL J., Div. Engr., General Electric Co., Bloomfield, N. J.

MACCREA, JOHN M., Mfrs. Agent, J. M. MacCrea Sales Co., Syracuse, N. Y.

MCKENZIE, HAROLD W., Estimator & Designer, Thompson Sheet Metal Works, Portland, Ore.

MERRITT, CECIL J., Shanghai American School, Shanghai, China. *(Reinstatement)*.

PENNINGTON, NEAL A., Research Engr., Tucson, Ariz.

RIGGS, OLIVER C., Research Engr., The Bahnson Co., Winston-Salem, N. C.

STALEY, MARTIN E., Cons. Mech. Engr., San Antonio, Tex.

STIPP, ROY A., Sales Repr., Greenville, S. C.

STRAHAN, JAMES L., Tech. Dir., Asphalt Roofing Industry Bureau, New York, N. Y.

TEBO, FRANK A., Indus. Engr., United Engineers & Constructors, Inc., Philadelphia, Pa.

TRIMBLE, C. R., Sales Engr., C. R. Trimble Co., Charlotte, N. C. *(Advancement)*.

WILKE, IRA W., Htg. Engr., Texas Public Service Co., Austin, Tex.

Associate Members

ALLCORN, LUTHER H., JR., Estimator, The Bahnson Co., Winston-Salem, N. C.

BACON, EARL, Mgr., M. F. Fischer & Son, San Antonio, Tex.

BEERS, VANCE A., Asst. to Mgr., Plbg. & Htg. Dept., Marshall-Wells Co., Portland, Ore.

BENGLE, CHARLES V., Sales Engr., Worthington Pump & Machinery Corp., Cincinnati, Ohio.

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DEATH OF C. J. RICE ANNOUNCED

Word has just been received by the Society of the death of Clarence J. Rice, Milwaukee, Wis., president of Sterling, Inc.

Mr. Rice joined the Society in 1923 and took an active part in the affairs of the Wisconsin Chapter. He served as its secretary in 1924 and 1925 and as a member of its Board of Governors.

Mr. Rice was born on July 4, 1887 at Osborne County, Kans., and attended the School of Engineering at the University of Wisconsin. In 1909 he became draftsman for the American Concentrator Co., Joplin, Mo., and a few years later joined the Allis-Chalmers Mfg. Co., Milwaukee, Wis., as sales engineer. From 1912 to 1919 he was owner and manager of his own building business firm in Milwaukee. Late in 1918 he became affiliated with Sterling Engineering, serving first as secretary and later becoming president.

In 1926 he accepted the position as sales manager of the Heating Division of Modine Manufacturing Co., Racine, Wis. In 1933, however, he returned to Sterling Engineering Co. and resumed his duties as president. In 1941 the company's name was changed to Sterling, Inc.

It is with regret that Mr. Rice's name is removed from the Society's roll of membership.

O. LLOYD MADDUX DIES AFTER SHORT ILLNESS

Oliver Lloyd Maddux, owner of the O. Lloyd Maddux Co., 53 Park Place, New York, N.Y., gas burner sales representatives, died on November 26, 1946, at All Souls Hospital, Morristown, N. J., after a short illness.

Mr. Maddux was born at Elberton, Ga., on September 2, 1892, and received his elementary education at Spartanburg, S.C. He attended Wofford College and in 1911 he became assistant superintendent of the South Carolina Light, Power and Railways Co., in charge of gas operations. After ten years he joined the Southern Gas Utilities as assistant to the president, in charge of operation of five properties.

In 1923 he became the New York metropolitan representative for the Pittsburgh Water Heater Co. After four years he left that concern to become chief engineer for the United Gas and Fuel Co. of Hamilton, Ltd., Ontario, Canada, where he had charge of the design and installation of heating equipment. Since 1931 he had full engineering charge of heating for the Union Gas Co. of Canada, Windsor, Ontario Gas Co., City Gas Co. of London, Ont., and the United Gas and Fuel Co. While in this connection he had charge of all layout and plans for all new heating and air conditioning installations, and designed and manufactured gas conversion units for house heating. He received recognition as a heating engineer throughout Canada and the United States.

In 1938 he formed his own company in New York. Mr. Maddux joined the Society in 1933 and was advanced to full membership in 1935.

The officers and Council of the Society extend their deepest sympathy to his widow, Mrs. Rhea George Maddux; his son, Oliver, and his daughters, Katherine and Elvira Maddux and Mrs. Traberis Harrison.

W. B. PATERSON'S DEATH ANNOUNCED

The death of William Bruce Paterson on September 18th last has been announced recently. In his fifty-seventh year, Mr. Paterson suffered a heart attack and died suddenly.

He was born at Denfield, Ontario, Canada on October 30, 1889, and received his B.A. degree in science from the University of Toronto.

He joined the staff of Sheldons, Ltd., Galt, Ont., as draftsman for heating and ventilating layouts, and after a year he was appointed assistant engineer. In 1919 he was employed by the American Blower Co., Detroit, in their sales department. He returned to Canada in a few years and was associated with the Canadian Sirocco Co., Windsor, Ont., in the sales department.

Later he spent four years with H. H. Angus, consulting engineer, Toronto. He also spent some years with the O. P. Hamlin Co., Windsor, Ont., and Crane, Ltd., Toronto, and in 1942 he was senior mechanical engineer with the Department of National Defense, Naval Service Works and Buildings, responsible for design of mechanical equipment of Naval barracks buildings, mess halls, hospitals, etc.

Mr. Paterson joined the Society in 1920 when he was elected to Junior membership, and in 1921 he was advanced to an Associate grade. He became a Member of the Society early in 1946.

The Officers and Council extend their sincere sympathy to his widow, Mrs. Neil Paterson, who resides at 331 MacLaren St., Ottawa, Canada.

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Memphis: Organized, 1944. Headquarters, Memphis, Tenn. Meets, First Monday. President, R. H. Hoshall, 65 McCall Pl., Memphis. Secretary, A. T. Bevil, 1521 Waverly Ave., Memphis 6.

Michigan: Organized, 1916. Headquarters, Detroit, Mich. Meets, First Monday after 10th of month. President, F. R. Bishop, 8011 Dexter Blvd., Detroit 6. Secretary, L. A. Burch, 5853 Hamilton Ave., Detroit 2.

Minnesota: Organized, 1918. Headquarters, Minneapolis, Minn. Meets, First Monday. President, J. E. Haines, 2747 Fourth Ave., S. Minneapolis 8. Secretary, O. L. Lilja, 5000 16th Ave., S., Minneapolis 7.

Montreal: Organized, 1936. Headquarters, Montreal, Que., Canada. Meets, Third Monday. President, A. B. Madden, 1170 Beaver Hall Sq., Montreal, Que. Secretary, S. W. Salter, 910 New Birks Bldg., Montreal.

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Nebraska: Organized, 1940. Headquarters, Omaha, Neb. Meets, Second Tuesday. President, H. Y. Kleinkauf, 514 S. 11th St., Omaha 8. Secretary, J. G. Bierl, 4927 N. 34th Ave., Omaha.

New York: Organized, 1911. Headquarters, New York, N. Y. Meets, Third Monday. President, W. A. Sherbrooke, 114 Liberty St., New York 6. Secretary, Carl H. Flink, Room 3000, 51 Madison Ave., New York 10.

North Carolina: Organized, 1939. Headquarters, Durham, N. C. Meets, Quarterly. President, C. Z. Adams, 312 Piedmont Bldg., P. O. Box 1356, Greensboro. Secretary, M. F. DuChateau, 205 S. Lyndon St., Greensboro.

North Texas: Organized, 1938. Headquarters, Dallas, Tex. Meets, Third Monday. President, C. R. Gardner, 1000 St. Louis St., Dallas 1. Secretary, G. A. Linskie, 3124 Milton St., Dallas 5.

Northern Ohio: Organized, 1916. Headquarters, Cleveland, Ohio. Meets, Second Monday. President, J. E. Wilhelm, 1906 Euclid Ave., Cleveland 15. Secretary, D. E. Mannen, Jr., 9104 Woodland Ave., Cleveland 3.

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Oklahoma: Organized, 1935. Headquarters, Oklahoma City, Okla. Meets, Second Monday. President, G. T. Donceel, Oklahoma Natural Gas Co., Oklahoma City. Secretary, W. W. Frankfurt, 519 Apco Tower, Oklahoma City.

Ontario: Organized, 1922. Headquarters, Toronto, Ont., Canada. Meets, First Monday. President, V. J. Jenkinson, 1221 Bay St., Toronto 5. Secretary, H. R. Roth, 57 Bloor St., W., Toronto, Ont.

Oregon: Organized, 1939. Headquarters, Portland, Ore. Meets, Thursday after First Tuesday. President, W. B. Morrison, Cascade Bldg., Portland 4. Secretary, E. R. Lokey, 1238 N. W. Glisan St., Portland 9.

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Pacific Northwest: Organized, 1928. Headquarters, Seattle, Wash. Meets, Second Tuesday. President, R. E. Le Riche, 6345 39th S. W., Seattle 6. Secretary, C. W. Finn, 320 - 8th Ave. N., Seattle 9.

Philadelphia: Organized, 1916. Headquarters, Philadelphia, Pa. Meets, Second Thursday. President, M. G. Kershaw, DuPont Bldg., Wilmington, Del. Secretary, J. W. McElgin, State Rd. and Rhawn St., Philadelphia 36.

Pittsburgh: Organized, 1919. Headquarters, Pittsburgh, Pa. Meets, Second Monday. President, A. F. Nass, 527 First Ave., Pittsburgh 19. Secretary, E. H. Riesmeyer, Jr., 231-33 Water St., Pittsburgh 22.

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Rocky Mountain: Organized, 1944. Headquarters, Denver, Colo. Meets, First Wednesday. President, F. L. Adams, P. O. Box 840, Denver 1. Secretary, J. J. Johnson, 1010 17th St., Denver 2.

•

St. Louis: Organized, 1918. Headquarters, St. Louis, Mo. Meets, First Tuesday. President, B. C. Simons, 4030 Chouteau, St. Louis 10. Secretary, W. A. Russell, 7918 Kingsbury Blvd., Clayton 5, Mo.

South Texas: Organized, 1938. Headquarters, Houston, Tex. Meets, Third Friday. President, B. P. Fisher, P. O. Box 92, Houston 1. Secretary, C. C. Quin, 809 Stuart Ave., Houston 6.

Southern California: Organized, 1930. Headquarters, Los Angeles, Calif. Meets, Second Wednesday. President, Art Theobald, 116½ S. Kings Rd. Secretary, R. S. Farr, 2615 Southwest Dr., Los Angeles 43.

Southwest Texas: Organized 1946. Headquarters, San Antonio, Tex. President, F. C. Benham, Jr., 702 S. Flores St., San Antonio. Secretary, R. W. Kotzebue, 438 Paseo Encinal, San Antonio 1, Tex.

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Utah: Organized, 1944. Headquarters, Salt Lake City, Utah. Meets First Wednesday. President, J. T. Young, Jr., Box 709, Ogden. Secretary, E. J. Watts, 2485 Douglas St., Salt Lake City 5.

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Virginia: Organized, 1946. Headquarters, Norfolk, Va. President, R. C. Thomas, 819 Westover Ave., Norfolk 7. Secretary, J. F. Reynolds, Gatling and Marble Ave., Norfolk 2.

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Washington, D. C.: Organized, 1935. Headquarters, Washington, D. C. Meets, Second Wednesday. President, L. B. Nye, Jr., 1100 H St., N. W., Washington. Secretary, J. N. Stewart, 6124 32nd Pl., N. W., Washington 15.

Western Michigan: Organized, 1931. Headquarters, Grand Rapids, Mich. Meets, Second Monday. President, J. W. Miller, Route 5, Box 498, Lansing. Secretary, K. E. Robinson, 211 Smith Ave., Lansing 10.

Western New York: Organized, 1919. Headquarters, Buffalo, N. Y. Meets, Second Monday. President, Herman Seelbach, Jr., 45 Allen St., Buffalo 2. Secretary, F. J. Weber, 443 Delaware Ave., Buffalo 4.

Wisconsin: Organized, 1922. Headquarters, Milwaukee, Wis. Meets, Third Monday. President, E. W. Gifford, 611 N. Broadway, Milwaukee 2. Secretary, B. M. Kluge, 1817 S. 66th St., Milwaukee 14.

Student Branch

Texas A. & M. College: Organized, 1946. Headquarters, College Station, Tex. Meets Third Thursday. President, K. W. Ryan, Texas A. & M. College, Box 701. Secretary, G. H. Jackson, Texas A. & M. College, Box 2787.

TEXAS A. & M. STUDENT BRANCH ORGANIZED

The Council acted favorably upon the petition of the students at the Texas A. & M. College, College Station, Tex., for a charter to organize a student branch.

The initial meeting of the group was held on October 28, at which time the following officers were elected: *President*—K. W. Ryan; *Vice President*—H. M. Kay; *Secretary-Treasurer*—G. H. Jackson; *Board of Governors*—W. W. Caudill, Wayne Long, J. S. Hopper; *Reporter*—LeRoy Brown. The newly elected president then announced the appointment of the chairmen of the following committees: *Program*, C. S. Rudloff; *Placement*, S. E. Murphree and C. L. Crowder; *Membership and Publication*, LeRoy Brown and A. E. Baron; and *By-Laws and Charter*, Charles Kaufman.

Three speakers addressed the first meeting. J. S. Hopper, assistant to Dean of Engineering at the College, and former teacher in air conditioning and refrigeration, spoke on the background and organization of the ASHVE, giving the students a better understanding of the functions of the Society.

C. W. Crawford, head of the department of mechanical engineering at Texas A. & M., stressed the importance of the advantages of a student branch of the ASHVE, and told of the part it should play in the student's life. He concluded by presenting the aims and purpose of the student branch.

W. W. Caudill, instructor in architecture, selected as his topic the architect's viewpoint, and the relation and importance in cooperation between architects and heating and ventilating engineers. The points he brought out were emphasized by his use of personal experiences in practice as illustrations.

After the three guest speakers of the evening, Prof. Wayne Long, the sponsor of the student branch, spoke briefly on the background of the Texas A. & M. Student Branch.

The second meeting of the Texas A. & M. Student Branch was devoted to a technical discussion on Radiant Heating and Cooling, and the attendance of nearly 150 students from the engineering and architectural schools was a splendid tribute to the speaker, Dr. F. E. Giesecke, past president of the Society and consulting engineer, New Braunfels, Tex. Dr. Giesecke, in his introduction, gave the basic principles of radiation and from this described the manner in which these basic concepts are applied in heating and cooling radiation. He than gave specific examples of the application of radiant heating and cooling, principally in Switzerland, where, he stated, it had proved itself over a period of about 15 years. He stressed the fact that not only is radiant heating practical, but radiant cooling can be employed successfully in the same system; the only limitation being the dewpoint. The various points of Dr. Giesecke's talk were illustrated by slides. An interesting discussion followed his talk.

One of the highlights of the meeting was the presentation of a gavel by Pres. Bert Fisher, South Texas Chapter, to the President of the Student Branch. President Ryan, in accepting the gavel, stated that it would stay in the possession of the Texas A. & M Student Branch as a symbol of the office and as a reminder of the close association of the Student Branch with the South Texas Chapter.

The South Texas members who made the trip for the meeting were: Bert P. Fisher, president, Charles C. Quin, secretary, and Messrs. Etie, Mannon, Mills, Taylor, Williams and Woodruff. The North Texas Chapter officers and members in attendance were: C. R. Gardner, vice president and Messrs. Holbrook, O'Connor and Owen. Both Vice President Gardner of the North Texas Chapter and President Fisher of the South Texas Chapter addressed the meeting.

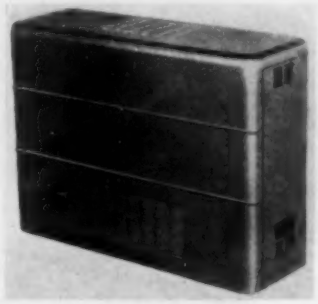
EQUIPMENT DEVELOPMENTS

For your convenience in obtaining more information about any of this equipment, see coupon on this page.

Multi-Room Air Conditioning System Combines Central, Separate Room Units

No. 3314—The Trane Co., La Crosse, Wis., has introduced its "Custom-Air" system of air conditioning large, multi-room buildings.

The new system consists of an individual unit in each room and a separate central system. Each of the room units is designed to recirculate and filter air and to offset sensible heat losses or gains in the space in which it is located. The central system is used to supply outside air, either humidified or dehumidified, through either a high or low pressure duct system.



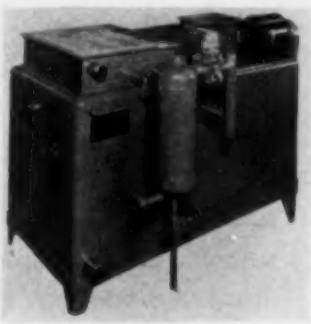
The two systems operate independently of each other as the room units are self-powered. This, says the manufacturer, provides for an unusually flexible installation which permits simultaneous heating in one room and cooling in another, in the same zone, and also provides for heating or cooling in a few offices without operating the entire system. Shown here is the individual room unit.

Filtering Unit Removes Odors

No. 3315—A new purifier for air conditioning systems, consisting of a filtering unit containing a special grade of activated carbon, has been developed by Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y.

According to the manufacturer, this purifier has been specified for use in 2000 railroad passenger cars now under construction and is also being used in hotels, restaurants, theaters, clubs, passenger ships, and aircraft. Specially designed units are available for frozen food lockers.

Small Evaporative Refrigeration Condenser



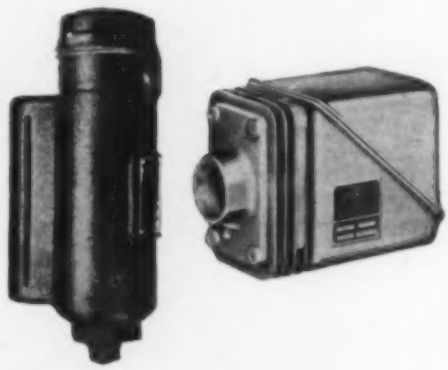
No. 3316—The "Bantam" model "Aeropass" condenser has been designed by Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y., for use with small air conditioning and refrigeration systems of two to seven tons capacity.

Operating under automatic control to maintain minimum practical head pressure at the compressor in all seasons of the year, the condenser uses the spray water principle. Features, as listed by the manufacturer, include the use of a precooling coil for reducing gas temperatures below the boiling point of water (to reduce scale deposit), the use of an oil separator between the dry coils and the spray coils, and "balanced wet bulb control" for maintaining uniform head pressures.

Flame Failure and Low Water Level Protection in Single Unit

No. 3317—"Fireye" control Type 18TS is designed to provide flame failure and low water level protection for commercial and industrial oil burning equipment, and is offered by Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.

The device consists of a photoelectric cell that sees the flame, a phototube, and an amplifying system housed in a dustproof case. The entire control is mounted on the furnace wall and a single probe, which is mounted in an auxiliary fitting parallel to the boiler water column and is wired into the control, shuts off the fuel supply and sounds an alarm when the water level reaches a low point.



The device is designed for use with 115 or 220 volt, a-c, 50-60 cycle current. The power consumption is 10 watts and the unit actuates a single pole, single throw relay rated at ½ hp at 230 volts.

Infrared Lamps Dry Unit Heaters

No. 3318—The unit heaters manufactured by the B. F. Sturtevant Co., Div., of Westinghouse Electric, Hyde Park, Boston 36, Mass., are now dried by a battery of 50 infrared lamps.

[*Continued on p. 196*]

Heating, Piping & Air Conditioning [1-47]

6 N. Michigan Ave., Chicago 2, Ill.

Please ask the manufacturers to send me more information about the equipment mentioned under the following reference numbers in Equipment Developments and Recent Trade Literature.

(Circle each number in which you are interested)

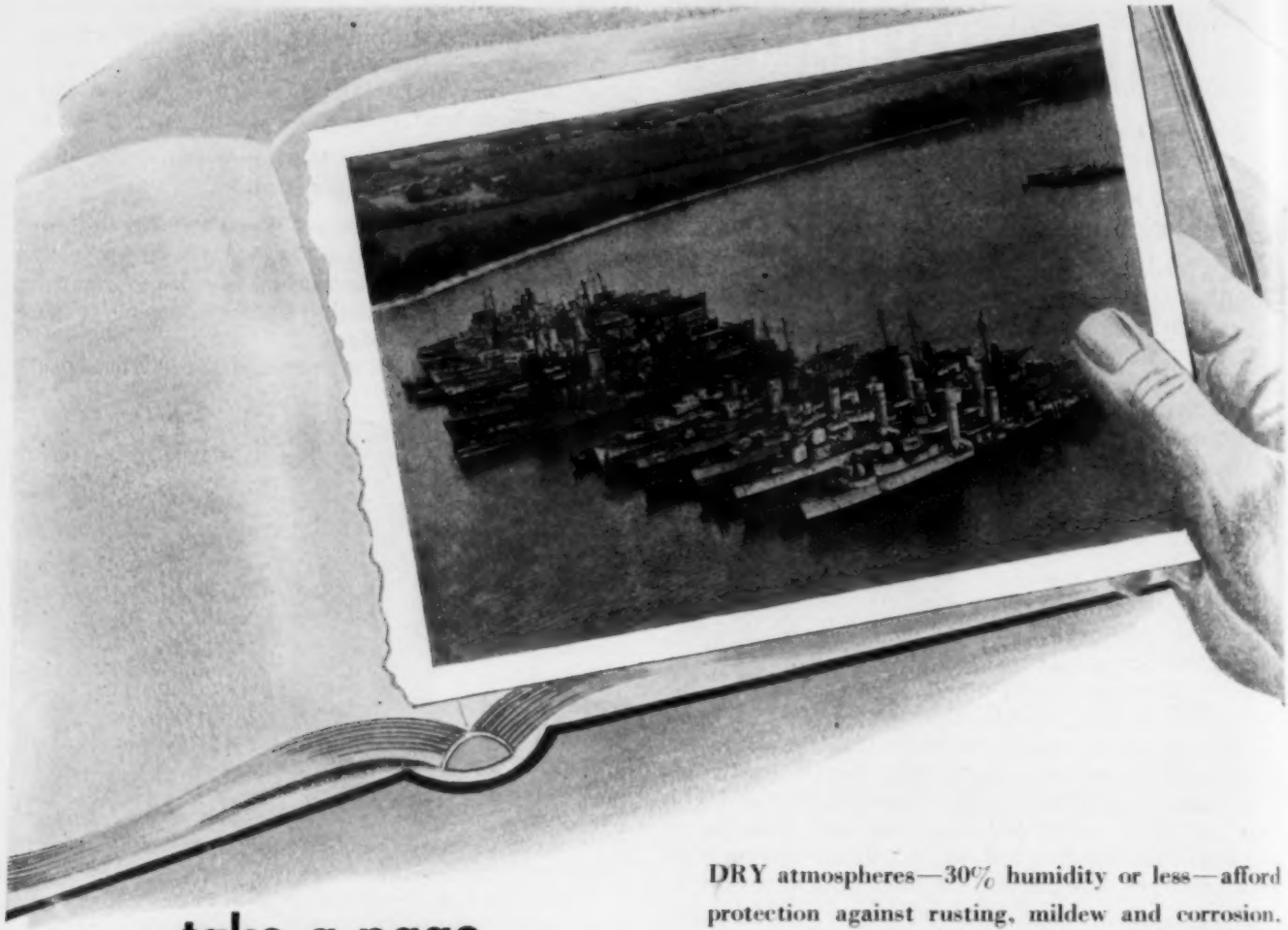
3314	3315	3316	3317	3318	3319	3320	3321	3322	3323
3324	3325	3326	3327	3328	3329	3330	3331	3332	3333
3334	3335	3336	3337	3338	3339	3340	3341	3342	3343
3344	3345	3346	3347	3348	3349	3350	3351	3352	3353
3354	3355	3356	3357	3358	3359	3360	3361		
6377	6378	6379	6380	6381	6382	6383	6384	6385	6386
6387	6388	6389	6390	6391	6392	6393	6394	6395	6396
6397	6398	6399	6400	6401	6402	6403	6404	6405	6406
6407	6408	6409	6410	6411	6412	6413	6414	6415	6416
6417	6418	6419							

Name..... **Title**.....

Company .....

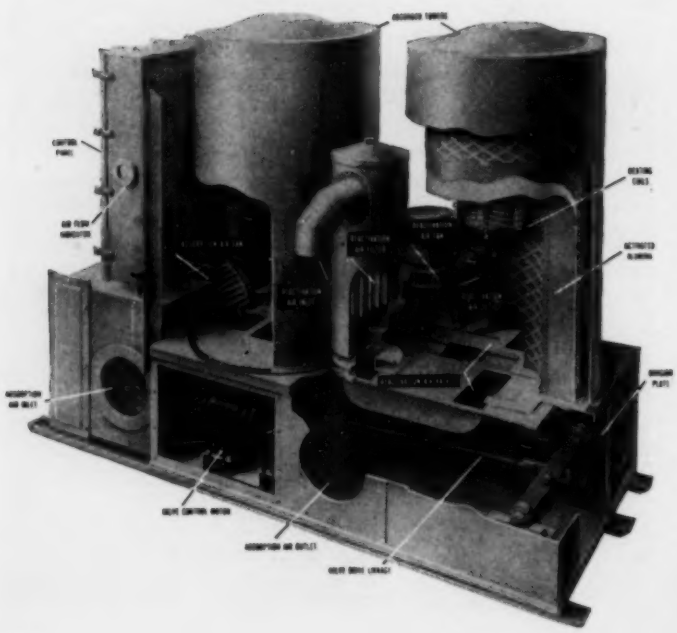
Address .....

City..... **Zone**..... **State**.....



take a page from the Navy's Book...

Operation Zipper



DRY atmospheres—30% humidity or less—afford protection against rusting, mildew and corrosion. The Navy established this fact, then executed "Operation Zipper" for preserving inactivated ships.

Lectrodryers play an important part in that plan—one to six per ship, dependent upon its size. Humidities are kept at low levels, and equipment can be made ready for use on short notice.

You can profit by this experience

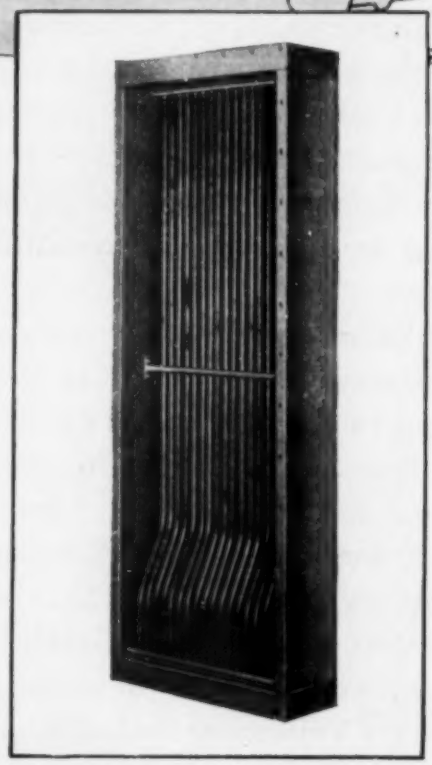
Manufacturing goes forward smoothly when it's carried on in constant humidities. Raw materials and finished products are safely stored for indefinite periods without danger of deterioration caused by too much moisture. You speed up and save on production. You avoid losses in storage.

Lectrodryer engineers can draw on a wealth of experience in DRYing air, gases and organic liquids to solve similar problems for you. For this help, write Pittsburgh Lectródryer Corporation, 327 32nd Street, Pittsburgh 30, Pennsylvania.

Lectrodryers dry with Activated Aluminas

LECTRODRYER

Before you select ANY COIL



New American Blower Heating Coil

1 CHECK THE MAKER

When choosing the heating or cooling coil that will do the best job for your specific installation first consider the engineering background and reputation of the maker. You'll find in short order that American Blower is one of the oldest and largest designers and manufacturers of air handling, air conditioning, heating, cooling and cleaning equipment.

2 Then the next step . . . DO THIS

Send for these two new bulletins, prepared by American Blower engineers. They make the work of selecting the best in coils quicker and easier. We've been told these bulletins are the most convenient guides and references ever printed on the subjects of coil selection, sizing and installation. All material is authoritative and up-to-the-minute. Here's all the information you will need in concise, easy-to-understand form.

Call the nearest American Blower Branch Office for your copies today. Or write for Bulletins B-1218 and 1521.

AMERICAN BLOWER

AMERICAN BLOWER CORP., DETROIT 32, MICH.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

AMERICAN BLOWER

Alnor

VELOMETER

The Alnor Velometer

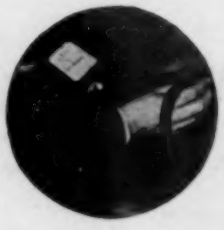
...the only instantaneous direct reading Air Velocity Meter

The only quick, convenient direct-reading means of checking air motion in ventilating, drying, air conditioning, and similar installations is with the Alnor Velometer. This instrument gives reliable information so easily that engineers and service men are encouraged to take complete data, for correct and efficient operation.

With the Alnor Velometer instantaneous direct readings of air speed are measured in feet per minute. With it checking draft, leaks around doors and windows, or in ducts, measuring velocities at outlets or in ducts is simple and convenient. Anyone can use the Velometer—without calculations, leveling, timing or their time-consuming conversions.

The Velometer is made in several standard ranges from 20 fpm to 6000 fpm, and up to 5 inches static or total pressure. Special ranges available as low as 10 fpm and up to 25,000 fpm velocity and 20 inches pressure. Extension jets permit accurate readings in many locations that would be completely inaccessible with other means of measurement. Write for Velometer Bulletin.

Velometer used for negative static pressure readings



Checking return grille reading with Velometer and suction type jet

ILLINOIS TESTING LABORATORIES, INC.

420 NORTH LASALLE STREET

CHICAGO 10, ILLINOIS

HERE IT IS!

the New SPORLAN *Catch-All* FILTER DEHYDRATOR

THE MOST PERFECT FILTER-DEHYDRATOR EVER DEVELOPED

SPORLAN

COMPLETELY DIFFERENT IN DESIGN!

- The unique construction of the Sporlan Catch-All provides effective moisture and dirt elimination in refrigeration systems.
- The drying agent of the Sporlan Catch-All unlike other drying agents is a *moulded porous cylinder* which *both* dehydrates and filters . .

IT CANNOT POWDER! • IT CANNOT PACK!

For
Peak Performance
on all installations
install a Sporlan
Catch-All
and take advantage of these extra features

- The Sporlan Catch-All will reduce the moisture content in an average installation with Freon, Methyl Chloride or Sulfur Dioxide refrigerant to at least 40% below accepted commercial standards!
- The Sporlan Catch-All will catch all scale, solder particles, carbon, sludge, dirt or any other foreign matter *as minute as 9 microns* with negligible pressure drop!

SPORLAN VALVE CO.
3723 COMMONWEALTH AVE., ST. LOUIS 17, MISSOURI

Before You Sell ANY Domestic Water System
See the PEERLESS Water King Advantages!

Exclusive Water King Features

GIVE PEERLESS DEALERS MORE TO TELL—MORE TO SELL!

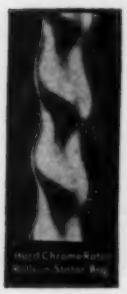
The Most Advanced Pumping Principle in the Last 10 Years

"Magic Wings to Water Lift" Lend "Magic Wings to Sales"

The trouble-free simplicity of the patented Water King pumping principle offers Peerless Dealers something really unique to talk about in the sales of Domestic Water Systems.

The PEERLESS Water King

Covered by Peerless Patent 2,346,428
Mfd. under R. Moineau's U. S. Letters Patents 1,892,217-2,028,407 —Reissue 21,374 and Canadian Patent 352,574; Robbins & Myers, Inc., Sole U. S. and Canadian Licensee.



The Peerless Water King is the pump with "Magic Wings to Water Lift." The Water King is a shallow well pump, embodying an exclusive "magic" pumping element; a hard chrome rotor revolving in a rubber stator that squeezes water upward—the most advanced pumping principle in the past 10 years. Capacities: 275 to 860 g.p.hr. Heads: Up to 40 lbs. The Water King is water lubricated—*there are no underground moving parts.* 100% automatic. Easily installed over the well or offset. Pumping element highly resistant to abrasive and corrosive action. Finely engineered—Quiet—Compact—Trouble-free.

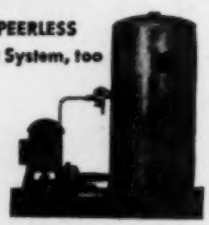
Peerless Pump Division of the Food Machinery Corporation aids its dealers with extensive consumer advertising, sales-stimulating display, merchandising and promotional helps. A good share of the profits in the wide domestic water systems market will go to the dealers who "go PEERLESS."

2 PEERLESS DOMESTIC WATER SYSTEMS

PEERLESS PUMP

"PLAN WITH PEERLESS"
Dealerships are still available in good territories. Plan with Peerless for a more profitable future by selling Peerless water systems! Write today for complete information.

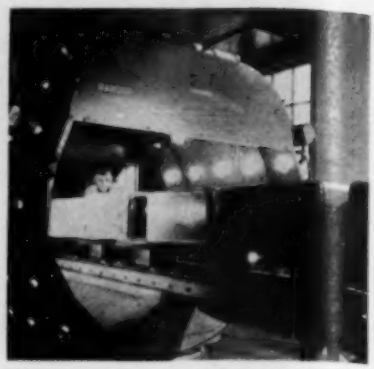
A PEERLESS Jet System, too



with many distinct and improved Peerless advantages. For deep or shallow wells. Capacities: 400 to 5000 g.p.hr. Lifts: Up to 120 ft.

PEERLESS PUMP DIVISION
FOOD MACHINERY CORPORATION
CANTON 6, OHIO • QUINCY, ILL. • LOS ANGELES, CALIF.
Factory Branches: Ardmore, Pa.; Decatur, Ill.; Atlanta, Ga.; Dallas, Tex.

[Continued from p. 191]



According to the manufacturer, the drying time has been cut about 75 per cent so they are completely dry after three minutes in the 150 deg oven. These "Speed Heaters" are in quantity production and are offered for stores, offices, and factories. Capacities range up to 5200 cfm air delivery.

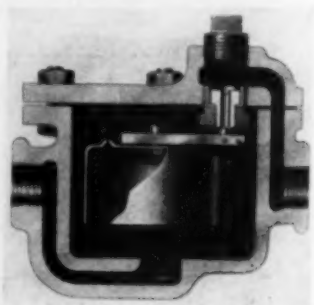
Recording Rotameter Utilizes Electronic Circuits

No. 3319—The combined engineering staffs of Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia 22, Pa., and the Foxboro Co. have developed a new type of recording rotameter utilizing the "Dynalog" system of transmission by electronic high frequency circuits.

The recording system, used on the recording rotameter, is based on the induction bridge system and is said to make available many new features for rotameter application. According to the manufacturer, this instrument provides instantaneous response to change of flow, continuous balance, rugged power, continuous connections, unit construction using four principal assemblies, direct linkage with no gears, positive linear motion, long life, and elimination of over-travel.

This induction transmittor is now available for recording the rotor positions of many standard SK rotameter designs.

Offers Inverted Bucket Steam Trap



No. 3320 — Hoffman Specialty Co., 1001 York St., Indianapolis 7, Ind., has announced the new Series 600 inverted bucket type steam trap for working pressures up to 200 psi.

Featuring straight through pipe connections, a simplified seat adjustment, stainless steel seat and pin, all working parts are said to be easily removed as they are connected to the bonnet.

Designed for use with hot water heaters, industrial drying equipment, unit heaters, and numerous steam appliances, these traps have capacity ratings from 900 to 5200 lb of water per hr.

CO_2 Fire Protection in Kitchen Combined with Fuel Shutoff

No. 3321—Walter Kidde & Co., 40 E. 34th St., New York 16, N. Y., has announced the use of a CO_2 fire protection system which automatically shuts off the supply of gas to cooking appliances.

THE *All Year* PROFIT PRODUCER

VORNADOFAN dealers are piling up profits this winter because this Finest of All Air Circulators sells just as well in winter as in summer. Truly an air circulator, not just a fan, VORNADOFAN circulates warm, heated air, minimizes drafts, and saves on fuel bills. Its summer cooling features are the sensation of the Industry.

Extensive all-year advertising, employing more than two dozen national journals, sells the public month in and month out. So order your requirements immediately. Profit *now*.

Topic of Conversation

Vornadofan

World's Finest Air Circulators

Guaranteed by Good Housekeeping

The
O. A. SUTTON *Corporation* WICHITA, KANSAS

Promote EXTRA PROFITS NOW... From Your Oil Heater Customer List

Add Thermostatic Temperature Control with This A-P HEAT REGULATOR SET

Most new oil heaters, as well as heaters sold since 1939, can be easily equipped with this modern fuel-saving convenience! That means extra sales and profits for you on today's heaters as well as a new source of income from your old customer-list. And you'll make new friends with every sale, for every home will appreciate the savings in oil, time, effort, and the uniform, healthful room temperatures possible at the mere setting of a *Thermostatic Dial*.

A-P Model 240-ED Heat Regulator Set . . . Fits all oil heaters equipped with A-P Model 240-DR, UR or YR Manual Controls.

This A-P Heat Regulator Set is easy to install on any Vaporizing Burner Oil Heater now using the A-P 240-DR, UR, or YR Constant Level Oil Control. The "Sales Package" is complete, including an Electric Conversion Top which mounts on present manual control, an accurate Wall Thermostat, a Transformer, and all accessories for quick and easy installation.

Make these extra Winter Profits NOW! Write for prices, samples and selling material.

(Be sure your new Heater Lines use A-P DEPENDABLE Oil Controls — for faster sales, greater customer satisfaction.)

AUTOMATIC PRODUCTS COMPANY

2460 NORTH THIRTY-SECOND STREET, MILWAUKEE 10, WISCONSIN

DEPENDABLE *Oil Controls*

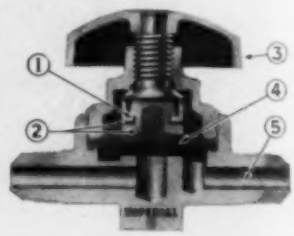
DESIGNED TO ELIMINATE SERVICING

The presence of fire is detected by a control which operates the system automatically. CO_2, which is supplied from steel cylinders to range hoods and exhaust ducts, actuates a pressure trip which in turn releases a chain normally used to hold open a weighted lever valve in the gas supply line to the kitchen.

Simplified Construction in Refrigeration Diaphragm Valve

No. 3322—The "DiaSeal" valve, a new refrigeration diaphragm valve featuring "either-way" flow, no spring, and only two moving parts, has been introduced by the Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.

Advantages of this valve, as stated by the manufacturer, are: (1) direct lift, without springs, providing positive control with flow in either direction, (2) simple construction, with only two moving parts, (3) quick opening and closing with less than two turns of the handle, (4) a long life diaphragm which is impervious to all common refrigerants, and, (5) inlet and outlet ports in line.

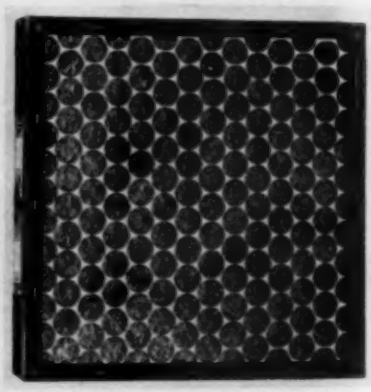


Valves are available in two-way and angle types with either flare or solder connections. Valve bodies are made from brass forgings.

Improved Air Filter in New Casing

No. 3323—An improved replacement type air filter for warm air heating and air conditioning systems has been developed by Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago, Ill.

The company's "Spider-Web" natural hair filters are contained in a new "honeycomb" casing and are available in five popular standard sizes. According to the manufacturer, the use of natural hair and the double layer construction provides unusual filtering efficiency in this improved unit.



Water Regulating Valve Designed for Self Cleaning

No. 3324—The new Model 68-B water regulating

BOTH THESE PIECES OF TUBING ARE THE SAME—*in surface area*

The one-inch length of Wolverine Trufin* —the integral finned tube—(with 7 fins per inch) has the same surface area as the long nine-inch length of plain tubing. Both are ½" O.D. What does this comparison suggest to you?

Of course, compactness, efficiency and economy.

If you want high efficiency in your heat transfer equipment, consider the many advantages the use of Trufin has for you. Our Engineering Department can draw on a wealth of experience to help you with any heat transfer plans you may be contemplating.

*Catalog No. 074042

WOLVERINE
TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

1411 CENTRAL AVENUE • DETROIT 9, MICHIGAN
In Canada: UNIFIN TUBE CO., LONDON, ONT.

WHO'S WHO AMONG WOLVERINE REPRESENTATIVES

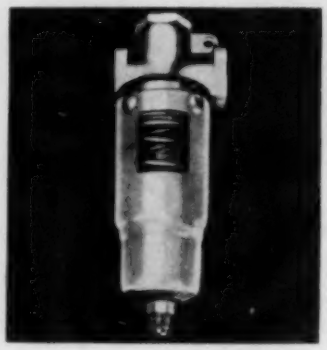
F. R. MEIER
60 E. 42nd ST.
New York 17, N. Y.

Tel. (New Jersey) Market 2-1526
(New York) Murray Hill 2-8430

Who serves the upper half of New Jersey

valve offered by Automatic Products Co., 2460 N. 32nd St., Milwaukee 10, Wis., features a molded composition seal on the valve stem which moves across a stainless steel seat. This is designed to provide a self-cleaning, wiping action.

The manufacturer states that this construction avoids common troubles due to dirt and lime in the water and eliminates valve seat replacement. Other features are said to include an unusually long stroke for providing close and uniform control, direct, through-flow construction, a restricting head pressure inlet orifice for reducing the effect of compressor pulsations, and a special "O" ring seal used to prevent leakage at the valve stem.



The unit has an operating head pressure of 50 to 150 psi and is available in three sizes, 3/8, 1/2, and 3/4 in. inlet and outlet. Designed for use with water-cooled condenser units, the valve may be used with "Freon," methyl chloride, or sulphur dioxide systems.

Mass Production of New Radial Refrigeration Compressors Scheduled

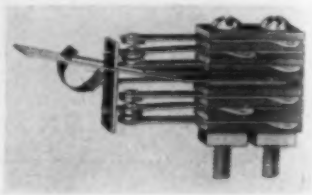
No. 3325—A new line of sealed, radial compressors in the 1/6 to 2 hp size and designed for commercial refrigeration, has been announced by Airtemp, Div. of Chrysler Corp., 1119 Leo St., Dayton 1, Ohio.

The compressor is scheduled for mass production as soon as materials and supplies can be obtained in proper volume. It will be produced in two, four, and six cylinder models, operating at 1750 and 3450 rpm for temperature ranges from –25 F to 45 F. According to the company, an outstanding feature will be great interchangeability of parts, one standard bore being used on all models. For use with d-c current a different end assembly is used.

Snap Action, Open Blade Switch Designed for Two Pole Application

No. 3326—A new snap action, open blade switch for two pole application has been announced by Acro Electric Co., 1392 Superior Ave., Cleveland 14, Ohio.

Made with both single and double throw contacts, the device features a patented beryllium rolling spring. Standard operating pressures are from 3 to 5 oz and the switch is rated at 15 amp, 125 volts, a-c, with a movement differential of approximately 1/16 in.



New Line of Temperature and Pressure Recorders Exhibited

No. 3327—The new line of temperature and pressure recorders and recorder-controllers offered by Penn Industrial Instrument Corp., 3116 N. 17th St., Philadelphia 32, Pa., was scheduled for exhibition at the recent 17th National Power Show.

The Rittling Corporation Announces

MAGNA-FIN

- **Heavy duty finned-type Convectors and Radiators for comfort heating and thermal processes.**
- **Rugged construction, withstanding up to 200 lbs. pressure.**
- **Exceptionally high heating capacity compacted into small space.**
- **Magna-Fin Convectors and Radiators replace plain pipe coils or cast iron radiation.**
- **Ideal for industrial, commercial and institutional applications.**
- **Now in production on 1¼" copper tube, aluminum fin and 1¼"-2" steel pipe, steel fin surface.**

Immediate delivery. Write for Catalog MFC-C1.

Also manufacturers of propeller fan unit heaters both of horizontal and down-blow types.

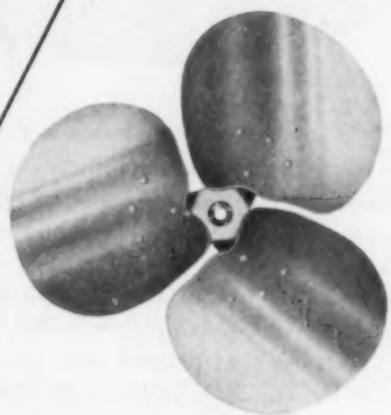
The Rittling Corporation • • • 1292-1298 Niagara Street • • • Buffalo 13, N. Y.

WANT PROPELLERS in a hurry?

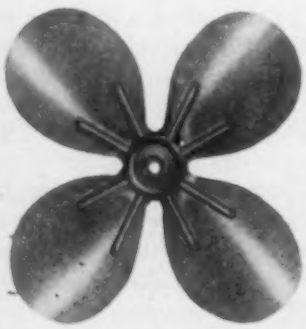
BURDEN BLADES

BURDEN can ship 'em! Not today, for we have our material and production problems, too. But prompt deliveries can be made on certain sizes of Full Pressure, Semi-Pressure and Free Air Blades. Full and Semi-Pressure Propellers are made of finished aluminum with plated steel spiders. Free Air type Burden Blades come in all steel, plated for attractiveness and rust resistance. Perfect balance assures air flow volume at its maximum. Attractive enough for any impeller equipped product—suitable for most.

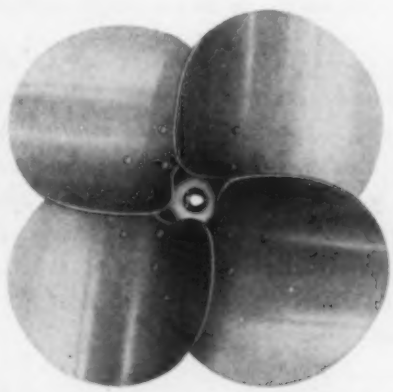
Specially Designed Blades · Wire Phone · Write for Quantity Prices



Aluminum Semi-Pressure Blades Available in 10" thru 30" sizes



Free Air Blades (plated steel) Available in 6" thru 12" sizes



Aluminum Full Pressure Type Available in 8" thru 24" sizes

burden COMPANY

1000 N. ORANGE DRIVE · LOS ANGELES 46, CALIF.

THE picture above shows a Zallea Duo-equalizing Expansion Joint installed on the main steam line of a large chemical plant which has a production capacity of $100,000 per day.

If this joint should fail, production would cease and costly delays result. But the word *"if"* just isn't associated with the job this Zallea Expansion Joint has to do. Installed 13 years ago, it is *still* performing its intended job *today*—absorbing movement due to contraction and expansion of the steam line.

It's the quality Zallea builds into *every* expansion joint that makes them last . . . even in the severest service. Remember, there's *no* packing to deteriorate . . . *no* maintenance required.

Zallea Corrugated Expansion Joints are made in non-equalizing, self-equalizing and duo-equalizing types, depending upon the conditions under which they must operate . . . of copper, stainless steels and other corrosion-resistant alloys . . . diameters from 3" upward . . . traverses up to 7½" . . . for pressures from vacuum to 300 psi . . . for temperatures from sub-zero to 1600° F. Let us quote on your requirements.

"Code-Craft"...
ZALLEA BROTHERS & JOHNSON
EQUIPMENT FOR THE PROCESS INDUSTRIES
816 LOCUST ST. • WILMINGTON 99, DEL.

Specify and Demand ZALLEA Furnace-Annealed Expansion Joints

Among the new equipment is a magazine chart feed for round chart recorders. Instead of a single chart, recorders are loaded with a pad of 100 charts so arranged that when the used chart is removed, a fresh chart is automatically brought to correct position. The electric chart drive motor is located in the corner of the case rotating the entire pad of charts through a rim engagement with a circular plate.

The company's new case features a universal construction for flush or wall mounting and is convertible from one to four pens and from recorder to recorder-controller.

Also scheduled for preview was a new model mechanical meter suitable for 2500 psi working pressure which will be marketed by the Hays Corp. early in 1947. This meter incorporates a magnetic clutch design, which together with the large float, is said to produce enough power to simultaneously operate two pens; one covering 0 to 100 per cent flow, the other 0 to 25 per cent flow. Both pens record across the entire chart.

West Coast Steel Mill Expands

No. 3328—The War Assets Administration has approved the sale of government owned facilities operated during the past three and one-half years to the Pacific Tube Co., 5710 Smithway St., East Los Angeles 22, Calif.

The company is said to operate the only mill of its kind west of the Rockies, producing cold drawn seamless steel tubing, welded steel tubing, and cold drawn bar stock in various analyses and sizes. Additional tube and bar making equipment is scheduled for installation as soon as it can be procured .

To Build New Office and Factory

No. 3329—An announcement that CPA approval has been given for the construction of a new factory and office building has been made by Jas. P. Marsh Corp., 2073 Southport Ave., Chicago.

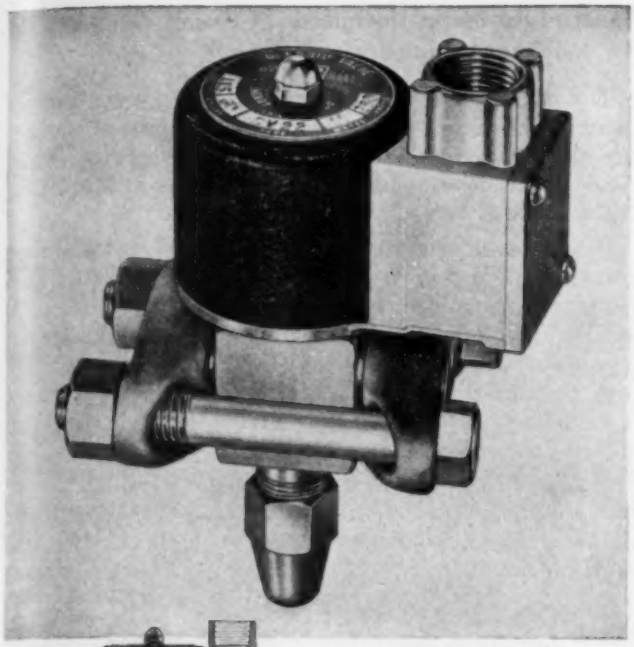
The new building, to be erected on a five acre tract of land located in Skokie, Ill., a Chicago suburb, will be a one story unit covering approximately 100,000 sq ft. According to the announcement, the building will incorporate the latest in industrial building design and will include air conditioned offices. Inasmuch as the company is engaged in the manufacture of industrial instruments and heating specialties, the new building will be used as a "guinea pig" for extensive research on heating methods.

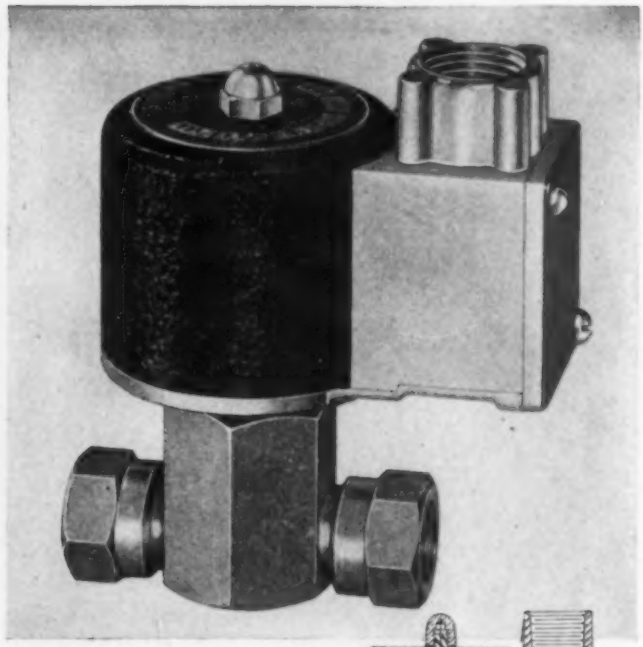
Humidity Indicating Ink

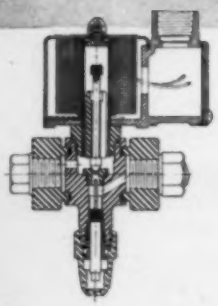
No. 3330—"HygroInk," a liquid which changes color with humidity changes, has been announced by Eljay Enterprises, P. O. Box 891, Newark 1, N. J.

The liquid may be painted, sprayed, or printed on paper, cloth, metal, or similar surfaces and application may be made with brush, pen, atomizer, spray gun, etc. It is humidity sensitive in that it changes in color from blue-green to pink as the humidity increases. According to the manufacturer, the change in color occurs when humidity approaches the point where mold, mildew, corrosion, rust, warping, etc. take place.

It is said to be suitable for checking the degree of moisture in rooms, containers, and tanks and to indicate moisture in powder, cereal, cloth, paper, etc.





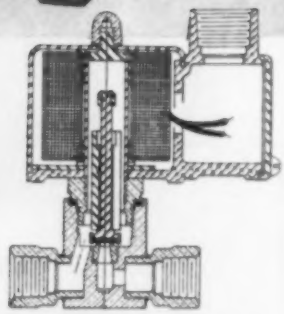


2 NEW Solenoid Valves

with

TYPICAL HENRY ADVANTAGES

- *Compact Size*
- *Rugged Construction*
- *Built-in Outlet Boxes*
- *Easy to Install*
- *Efficient, Quiet Operation*
- *Easy to Service*



MODEL SV-22

- For Ammonia and other fluids non-corrosive to steel
- 10-ton capacity
- Hardened steel renewable seat

GIVES YOU THESE 10 FEATURES

1. Rugged steel body.
2. Come-apart construction for easy servicing.
3. Stainless steel interior parts.
4. 10-ton ammonia capacity, with two-pound pressure drop.
5. Aluminum die-cast junction box.
6. Hardened steel renewable seat.
7. Easily rotated coil and junction box.
8. ⅜" or ½" FPT flanged connection.
9. Standard voltages. 115/60 and 230/60, AC.
10. Triple-impregnated coils, moisture-repellant and oil-resistant. Low current consumption. Flamenol lead wires.

In the new SV-21 for Freon and SV-22 for Ammonia, Henry Valve deals another "pair of aces." Henry advanced design features make both these valves easy to install and service, pay you dividends in quiet, efficient, positive protection, and low current consumption. Check the "specs" on these two new, dependable, long-lived Henry Solenoid Valves right now . . . and ask your Henry jobber for full details.

Watch for future announcements of additional new Henry Solenoid Valves with advanced design features

MODEL SV-21

- For Freon, Methyl Chloride, Water, Air, Oil, Gas, etc.
- 2-ton capacity
- Soft seat for positive shut-off

GIVES YOU THESE 10 FEATURES

1. Non-corrosive brass body.
2. Come-apart construction for easy servicing.
3. Stainless steel interior parts.
4. 2-ton Freon capacity, with two-pound pressure drop.
5. Aluminum die-cast junction box.
6. Renewable Neoprene "soft-seat" for more positive shut-off.
7. Easily rotated coil and junction box.
8. ⅜" FPT connection std., available on special order with flare and solder connections.
9. Standard voltages 115/60 and 230/60, AC.
10. Triple-impregnated coils, moisture-repellant and oil-resistant. Low current consumption. Flamenol lead wires.

HENRY VALVE COMPANY

Control Devices, Valves, Driers, Strainers and Accessories for Refrigeration and Air Conditioning and Industrial Applications

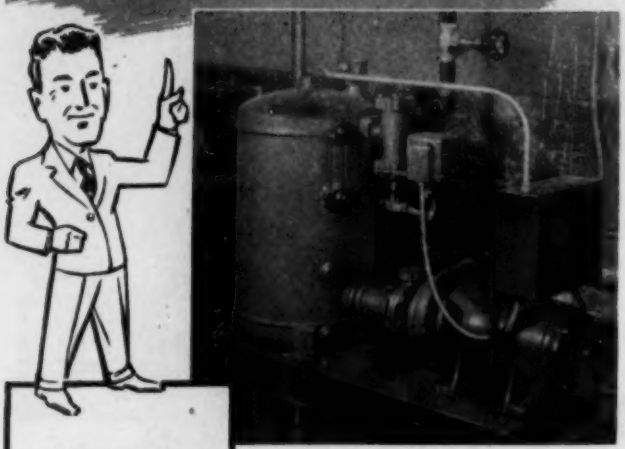
3260 W. GRAND AVENUE • CHICAGO 51, ILLINOIS

HENRY VALVE CO. CONTROLLING FLOW SINCE 1914

Cable: HEVALCO CHICAGO 6

YOU CAN COUNT ON EXTRAORDINARY SAVINGS YEAR AFTER YEAR

WITH THE JOHNSON *High Temperature* BOILER FEED SYSTEM



PAYS FOR ITSELF IN ONE YEAR

The Johnson High Temperature System can, in many installations, save enough fuel and power to pay its own costs in less than one year. This can be proved by facts and figures based on accepted engineering practice and has been substantiated by hundreds of installations. Get all the facts for your plant.

Saves up to 15% on fuel

The Johnson High Temperature System is a revolutionary method of boiler feeding that can result in extraordinary savings. By maintaining a slight controlled pressure in the receiver condensate is kept at 270° or more, and thanks to the pressure-equalizing principle can be returned to boiler at such temperatures without flashing. This means that fewer heat units are required to raise the returned condensate to boiler temperature—a gain in thermal efficiency that results in direct fuel savings.

Pumping Costs reduced as much as 60%

Ingeniously simple, the Johnson System automatically equalizes the pressure on the pump with boiler pressure so that a simple low-powered centrifugal pump takes the place of a high-powered steam or multi-stage centrifugal.

Maintenance is reduced to a minimum

Only a low speed, low maintenance pump is needed—all it does is raise the condensate a few feet to boiler level.

With what size boilers can it be used?

The Johnson High Temperature System can be used with all boilers operating at pressures up to 200 lbs. Single units are available in sizes for boilers from 30 to 500 hp.; multiple units for all larger boilers. Operation is automatic and the system is complete in every respect.

Write for catalog and full information.

The Johnson Corporation JC

806 WOOD STREET, THREE RIVERS, MICHIGAN

Centrifugal Pump Designed for Moderate Capacity

No. 3331—"Pedrifugal" pumps are a new line of centrifugal pumps which are designed to be of moderate capacity and to sell at a competitive price. They have been developed by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

The pumps are of cast iron, bronze-fitted, pedestal type construction and are available in three sizes with capacities ranging from 10 to 500 gpm at heads from 10 to 100 ft. Power requirements are from ¼ to 15 hp. Units are designed for use with the company's "Texrope" v belt drives and are fitted with impellers of maximum diameter so that variations in capacity are provided by changes in speed through sheaves of larger or smaller diameter.

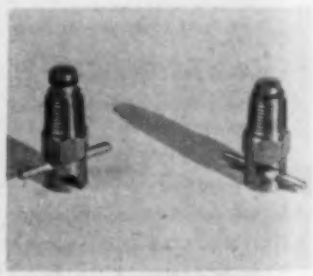
Compactness and the fact that the pumps will operate in any position are said to make the unit well suited to use with commercial washers, cleaners, large diesels, machine tools, air conditioners, heat exchangers, and cooling towers.

Small Solenoid Valve Fits Standard Outlet Box

No. 3332—The Henry Valve Co., 3260 W. Grand Ave., Chicago 51, Ill., has announced the production of a new Type SV-11 valve which is designed for small capacity installations involving the use of "Freon," methyl chloride, water, air, oil, gas, etc.

Incorporated in a standard outlet box, it can be mounted through screw holes provided, and the electrical connections are made by utilizing one of three knock-outs in the outlet box. The coil is designed to be removed and replaced without disturbing electrical connections to the thermostat or other electrical devices. It is furnished with ⅜ in. FPT connections for use with 115 or 230 volt, 60 cycle current, and can be furnished with larger outlet boxes where multiple electrical terminals are required.

Drain Valve Opens With One Quarter Turn



No. 3333—A small drain valve for water, fuel oil, and other liquids is offered by Curtis Automotive Devices, Inc., 8 Norwood Ave., Dayton 7, Ohio.

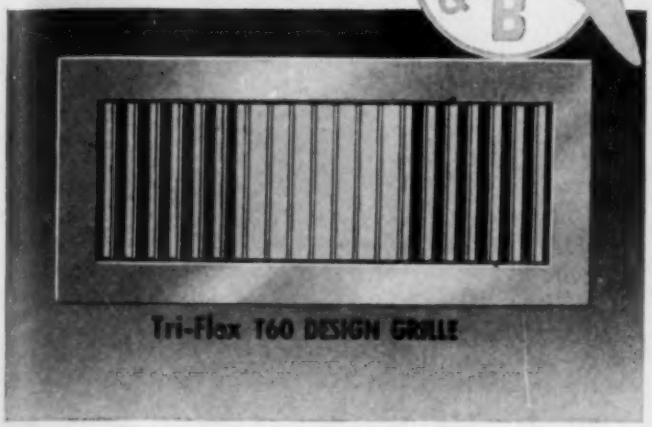
The manufacturer states that simple construction coupled with quick action (only one quarter turn completely opens it) make the valve suitable for any drain problem. It is designed for radiators, blocks, heaters, and other applications in ⅛, ¼, ⅜, and ½ in. sizes.

Constructing New Manufacturing Plant

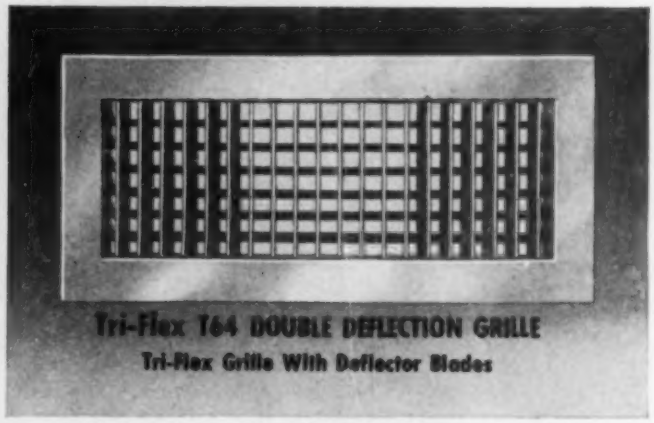
No. 3334—The York Heat Div., York-Shipley, Inc., York, Pa., has announced that construction of its new manufacturing plant is now under way.

ANNOUNCING THE NEW....

Tri-Flex DESIGN



Tri-Flex T60 DESIGN GRILLE



Tri-Flex T64 DOUBLE DEFLECTION GRILLE
Tri-Flex Grille With Deflector Blades

Maximum Flexibility TO MEET ALL CONTROL REQUIREMENTS

Tri-Flex T62 MULTI-SHUTTER REGISTER
Tri-Flex Grille With Multi-Shutter Damper

Tri-Flex T642
DOUBLE DEFLECTION MULTI-SHUTTER REGISTER
Tri-Flex Grille With Deflector Blades And Multi-Shutter Damper

The new TRI-FLEX design is the result of many years of research and experience in the manufacture of air conditioning grilles and registers. It brings new beauty and new efficiency to the Tuttle & Bailey line . . . and the great advantage of standardization in manufacture that will help us to give even better service to those who use our equipment.

TRI-FLEX grilles and registers make possible really complete and efficient control of air delivery in three ways—control of direction, control of throw, and control of air drop, each of which is equally important if an air conditioning system is to function properly. The TRI-FLEX grilles and registers shown above are made up of various combinations of three flexible units, the grille with individually adjustable front bars, the individually adjustable horizontal deflector blades, and the "positive control" multi-shutter damper.

Specify the new Tuttle & Bailey TRI-FLEX line and you specify better engineered control of air distribution.

TUTTLE *and* BAILEY

NEW BRITAIN, *Connecticut*

ENGINEERED PRODUCTS MEAN BETTER AIR DISTRIBUTION

The plant with its private rail facilities and storage buildings will occupy most of a 43 acre plot in East York. Buildings and equipment will be of modern design and will greatly increase the company's production of domestic, commercial, and industrial oil-fired heating equipment.

Develops Packaged Room Air Conditioner

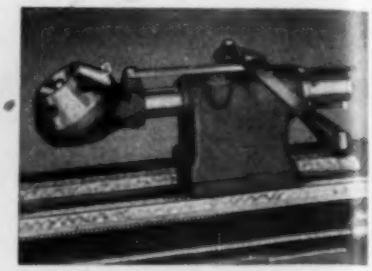
No. 3335—The Model C3 packaged air conditioning unit has been developed by the Sterling Refrigeration Co., Inc., 1737 Pennsylvania Ave., N. W., Washington 6, D. C.

The outstanding feature of this 3 hp unit, says the manufacturer, is the introduction of cooled air to the room at the living level and the removal of stale air, smoke, etc., from the upper level. The air-cooled compressor-condenser unit is located in the top of the unit and a 2400 cfm blower is used to draw outside air to the condenser and to discharge the heated air to the outside. A register or grille may be installed in the air supply duct to draw air out of the room from the upper level and outside air is supplied to the room by means of opening windows, doors, etc. A separate 1200 cfm blower is used to circulate room air through the conditioning unit.

Handlever Turret for Lathes

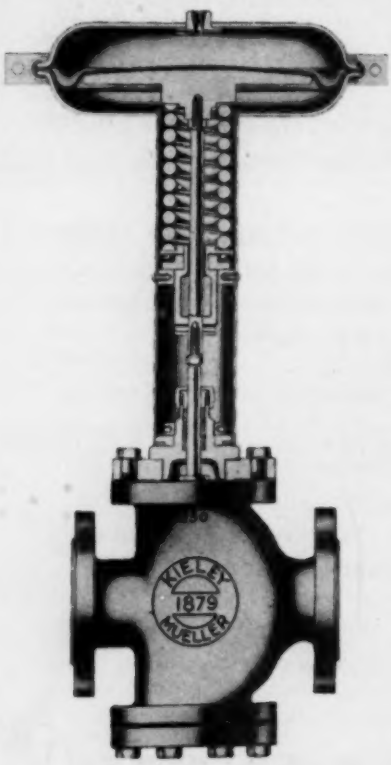
No. 3336—A new tailstock type handlever turret is designed to give turret lathe efficiency to 9 in. lathes. Manufactured by the South Bend Lathe Works, 219 E. Madison St., South Bend 22, Ind.

This turret mounts on the inside ways of the bed in place of the tailstock. The six-station turret head accommodates tools with 5/8 in. diameter shanks. The length of the cut at each station is regulated by means of an adjustable set screw. Stop mechanism is geared to operate automatically in unison with the indexing of the turret head. The index lock releases automatically at the end of the turret slide's return stroke and indexing is done by hand. Operations can be repeated, or skipped, at will. Turret slide has a maximum stroke of 3¼ in.



Carrier for Retractable Tubing

No. 3337—The "Spira-Tote," a combination carrier and stowage rack for convenience in handling retractable tubing or storing it when not in use, has been developed by Warner Bros. Co., Spiratube Div., Bridgeport 1, Conn., manufacturer of "Spiratube" flexible tubing.



OPEN
for inspection...

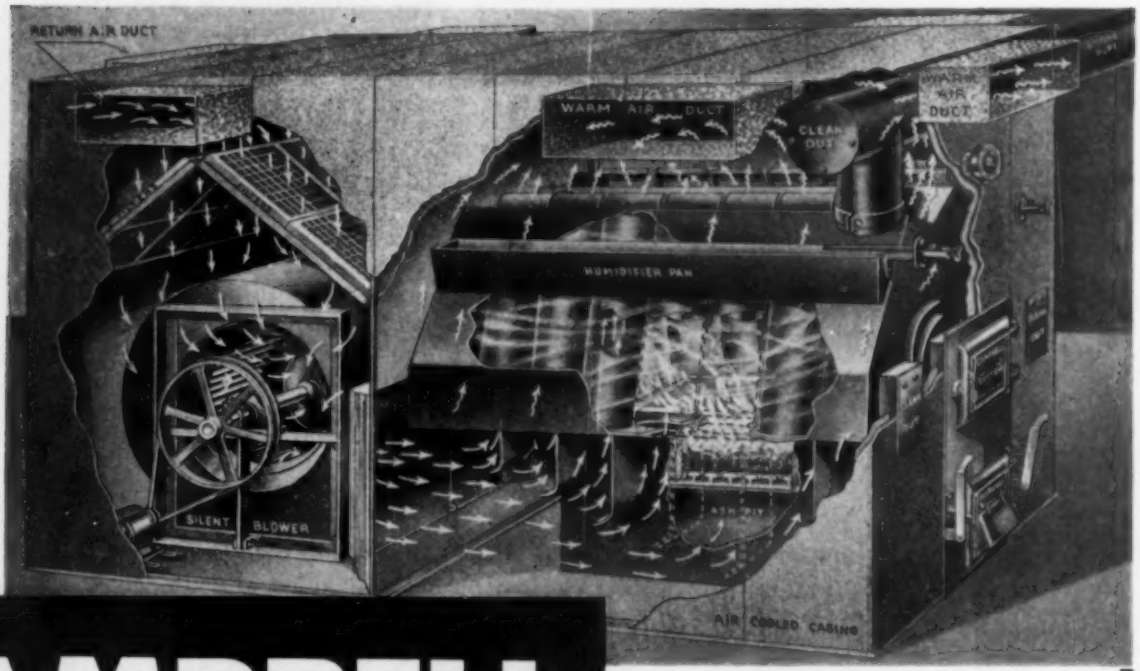
It's easy . . . any time . . . for inspection or maintenance. Just two clamp screws to open and the diaphragm casing is off. Just open the door in the yoke and the spring adjustment and stuffing box are exposed. For other equally important new features of the revolutionary new K & M KONTROL MOTOR, check this list:

- **Pressed steel Diaphragm Casing . . . lighter . . . tougher.**
- **Rigid Welded Steel *Tubular* Yoke.**
- **Duo-seal molded diaphragm provides high travel, uniform loading.**
- **Long calibrated Steel spring . . . fully enclosed.**
- **Enclosed ball bearing spring adjusting screw.**
- **Streamlined Flow Valve Body for high capacity . . . unrestricted flow areas.**
- **Super finished Inner Valve Guides, *honed* guide bushings, top and bottom . . . for minimum friction; increased life.**

KONTROL KIELEY & MUELLER MOTOR

2033 43RD ST., NORTH BERGEN, N. J.

REPRESENTED IN
New York City, Detroit, Cincinnati, Houston, Los Angeles, Rochester, Pittsburgh, Tulsa, New Orleans, San Francisco, Chicago, Baltimore, Dallas, Denver, Portland



CAMPBELL
8000 SERIES
HEATERS

GAS, OIL, STOKER OR HAND FIRED

For Churches, Schools, Theaters, Commercial and Industrial Buildings

Campbell Heaters have demonstrated the adaptability and efficiency of warm air heating for large structures. Quick heat delivery, positive control of temperature, humidity and ventilation, plus adaptability for summer air conditioning, make Campbell Heaters the logical choice where outstanding performance is desired.

No.	Heat Loss of Building, Btu per hr.	Maximum Capacity, Btu per hr.	Heating Surface, sq. ft.	Grate Area, sq. ft.	Blower, cfm	Motor Size, hp	Casing Dimensions, inches			Add. Space for Blower, inches	Approx. Ship. Wt., lbs.
							L	W	Ht.		
8075	483,000	725,000	280	7.5	8,850	¾	80	75	88	54	4,500
8100	596,000	893,000	320	10	10,900	1	93	75	96	60	5,500
8125	720,000	1,080,000	360	12.5	13,200	1½	105	75	96	66	6,500
8150	850,000	1,275,000	440	15	15,600	2	118	75	102	66	7,500
8175	960,000	1,440,000	480	17.5	17,500	2	130	75	102	72	9,000
8200	1,150,000	1,725,000	600	20	21,100	2	137	94	120	76	10,000
8250	1,440,000	2,160,000	750	25	26,400	3	157	94	120	76	12,000

Engineering Service

Our Engineering Department is staffed by trained graduate engineers backed by 60 years of practical experience. We will be glad to help solve any heating or ventilating problems or help with layouts and specifications for churches, schools, garages or any large buildings.

CAMPBELL HEATING COMPANY • DES MOINES 17, IOWA

Heating Specialists for over 60 Years

RIDAL SERVICE restores to original operating efficiency your entire system CHEMICALLY, such equipment as:

CONDENSERS	STEAM FEED LINES
WATER HEATERS	STEAM KETTLES
COOLING AND HEATING COILS	CONDENSATE RETURNS
PREHEATERS	TRAPS OF ALL KINDS
HEAT EXCHANGERS	FAN BLADING
EVAPORATORS	TURBINES

RIDAL SERVICE guarantees to remove SLUDGE and all other foreign matter from your entire operating equipment with harmless chemicals SAFELY and economically.

We have cleaned thousands of difficult jobs successfully and guarantee complete satisfaction.

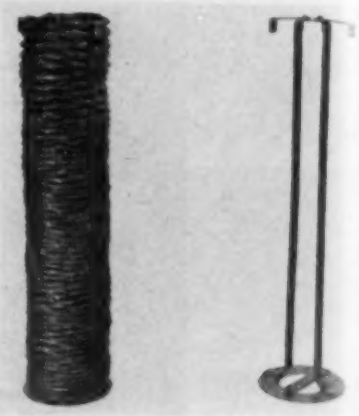
We also sell the chemicals we use separately, without service. Get our consultation service without obligation.

LEAKY FAUCETS of the common compression type can be restored to like-new condition with the new APEX-NO-DRIP—a machined brass bushing set in a lead cone. Easily installed. Write for details.

Write today for folder

APEX ENGINEERING COMPANY
Randolph 7100 205 E. Wacker Dr., Chicago

The rack comes in various sizes to accommodate different lengths and diameters of tubing, which is noncollapsible in operation, but is piled upon the rack and locked into position. Hinged extension pieces at the top of the rack turn to permit the tubing to slip onto the rack, then move out, locking tubing in place.



Many lengths of tubing can be stowed on trucks in tool rooms or on shipboard. The amount of retractability averages about 8 to 1. For example, a 10 ft section of 16 in. tubing is easily compressed to about 11 inches.

The device is made of steel, finished with enamel. It is light in weight, which together with the lightness of the company's tubing, is said to provide the handiest means of portable ventilation.

One Piece Aluminum Alloy Blades Used in Exhaust Fan

No. 3338—"Stil-Blade" propeller type exhaust fans, offered by Howry-Berg Steel & Iron Works, 2949 N. Speer Blvd., Denver 11, Colo., feature blades which are cast in one piece of aluminum alloy with a reverse curve at the back edge.

According to the manufacturer, the blade design causes the air to move uniformly over the entire surface, permits the use of duct systems of considerable length, and provides quiet and efficient operation. The fan and motor are mounted on a welded steel frame.

Fans are available from 12¾ to 26½ in. in diameter with capacity ratings at free discharge up to 9500 cfm.

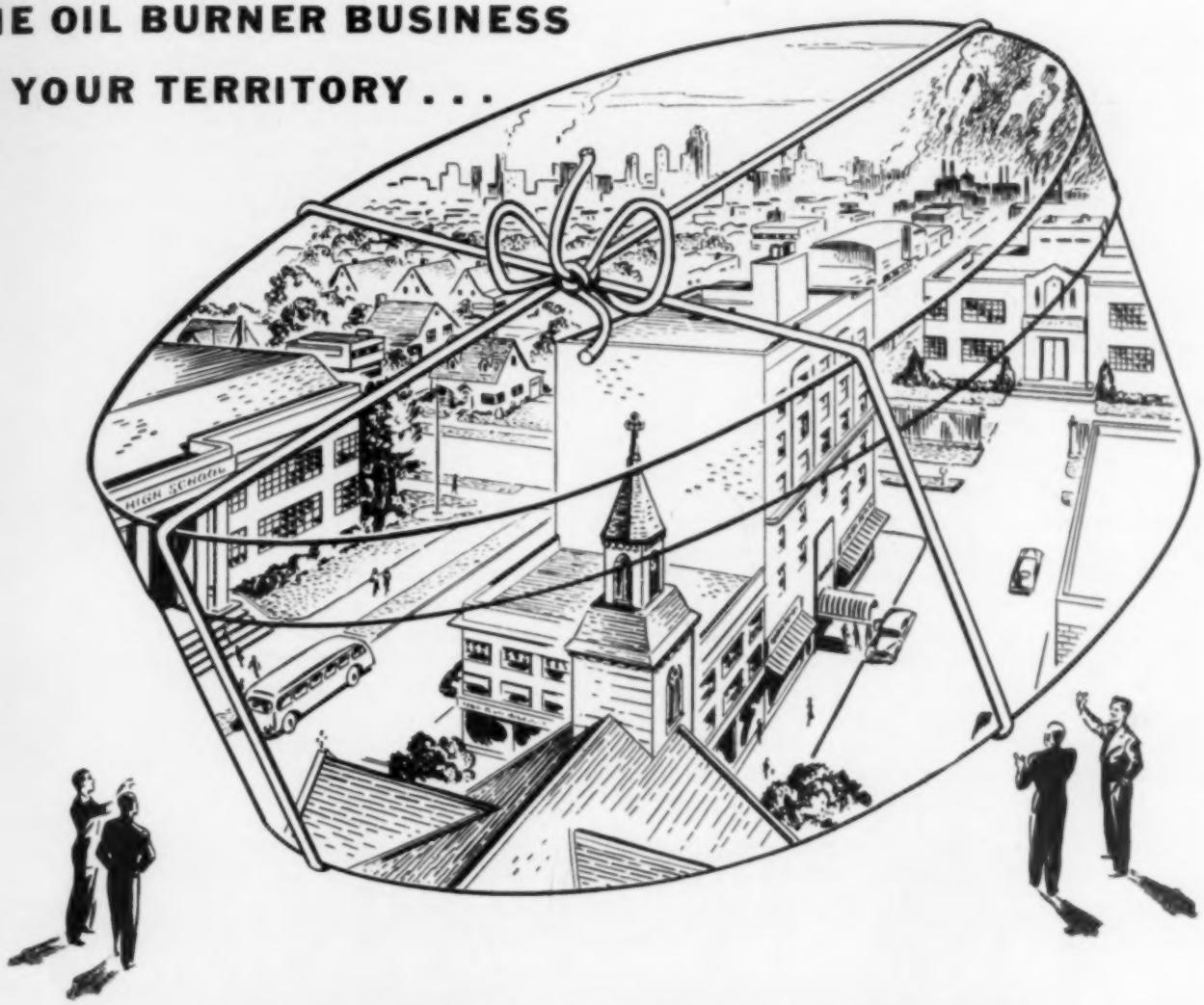
Uses Flexible Ducting in Exhaust System

No. 3339—A flexible vacuum cleaning unit for conveying sawdust, chips, and shavings to a main exhaust line is but one of the various applications of "Spiratube" flexible ducting offered by Warner Bros. Co., Spiratube Div., Dept. 4, Bridgeport 1, Conn.

The ducting is a thermoplastic-coated duck fabric which is spiral-stitched around a helical spring core. It is self-extending and retractable. In the device shown here, the intake end of the tubing is clamped to a metal nozzle on which a metal strap is bolted to serve as a handle. The discharge end of the ducting is fastened to the main exhaust line by means of a sheet metal adapter fitted with lugs which fit into a bayonet slot in the main line.

"WRAP UP" ALL

THE OIL BURNER BUSINESS IN YOUR TERRITORY . . .



WITH PETRO EQUIPMENT, you can go after EVERY oil heating job, from residences to apartments, from commercial establishments to industrial plants. For in the *complete* PETRO line, you'll find units to meet any oil firing need.

You can select pressure-atomizing models for from 1 to 18 gallons per hour of domestic fuels. For heavier duty, horizontal rotary cup models handle from 11 to 145 gallons per hour of heavy commercial oils. Whatever the model and size you choose, a PETRO is the product of nearly 45 years' specialization in oil heating . . . engineering skill . . . and experience.

PETRO burners, water heaters, and boiler-(or furnace-) burner units are distributed by established heating wholesalers. Write for the name of the supplier nearest you.

PETRO

REG. U. S. PAT. OFF.

MAKERS OF GOOD OIL BURNING EQUIPMENT SINCE 1903

PETROLEUM HEAT AND POWER COMPANY · STAMFORD, CONNECTICUT

PETRO FUEL OIL BULK PLANTS, DISTRIBUTION TERMINALS AND FACILITIES IN: BOSTON · PROVIDENCE · STAMFORD MT. VERNON · NEW YORK · MINEOLA · NEWARK · PHILADELPHIA · BALTIMORE · WASHINGTON · CHICAGO

Instrument Maker Buys Plant

No. 3340—First in that area to exercise a lease-option arrangement with the Reconstruction Finance Corporation, the Friez Instrument Div., Bendix Aviation Corp. has assumed full ownership of its Towson, Maryland, plant and facilities.

The plant, which was built in November 1941, was an important wartime producer of weather instruments of all sorts plus gun fire interrupters for turrets of all Martin aircraft.

Established over seventy years ago, the business became a division of the Bendix Aviation Corporation on July 1, 1930, when it was purchased from the founder. Its program for a resumption of the manufacture of heating and air conditioning controls is almost completed.

Gas-Fired Space Heater Uses Outside Air for Combustion

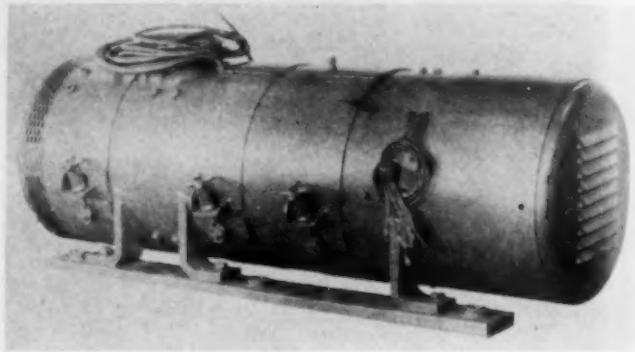
No. 3341—"Saf-Aire," a new gas-fired space heater developed by Heating Research Corp., Muncie, Ind., uses outside air for combustion and vents the burned products of combustion directly to the outside.

Designed for individual room use and available with thermostatic control, the unit is offered in two sizes, 10,000 and 20,000 Btu per hr. The unit is installed between the studs of an outside wall, projecting less than 4 in. into the room. The burner is enclosed in a sealed, cast aluminum combustion chamber which has small vents through which air is drawn from the outside and other vents through which the products of combustion are discharged directly to the outside. A patented safety vent is said to assure proper draft at all times.

The heater, available for use with natural, manufactured, or liquefied petroleum gas, is said to have been field tested by 22 gas utility companies.

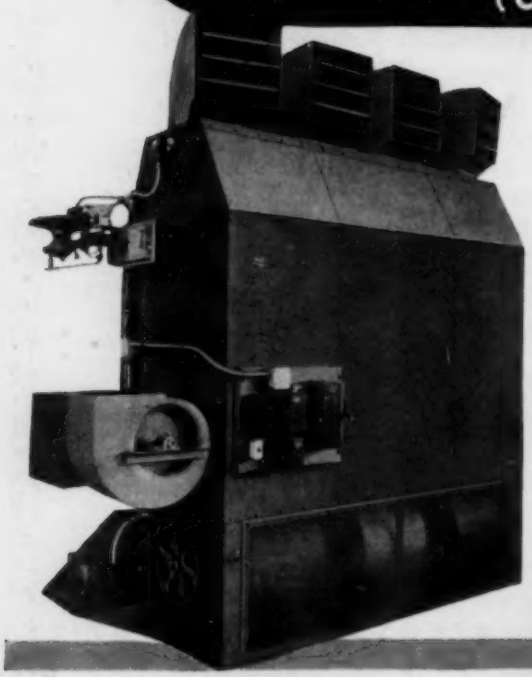
Amplidyne Booster Inverter Provides a-c Current for Railway Cars

No. 3342—The amplidyne booster inverter has been developed by General Electric Co., Schenectady, N. Y., to change the current supplied by a railway car's axle-driven generator or battery from d-c to a-c.



The new unit, says the manufacturer, provides constant voltage and frequency without excessive losses, and with less maintenance than older methods. It is also said that radios, movies, public address systems, fluorescent lighting, and improved air conditioning, previously not economically practical, will be possible in railroad passenger cars.

More Efficient Heating With
AIRTHERM Direct-Fired Warm Air Heater
(Oil or Gas Fired)



Direct heat transfer through a single thickness of metal results in the high efficiency and low operating cost of the Airtherm Direct-Fired Warm Air Heater. The Airtherm is a self-contained heating system — ready to connect to your fuel and power supply lines.

Capacities from 650,000 to 1,950,000 B.T.U.'s. Either oil or gas-fired.

✓ *Write for Bulletin 801 describing this economical heater in detail.*

"See our exhibit Seventh International Heating & Ventilating Exposition Cleveland, Ohio, January 27-31,1947."

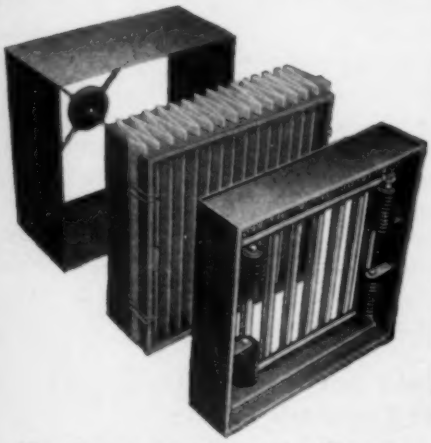
AIRTHERM
MANUFACTURING COMPANY
AT-43
711 So. Spring Ave. • St. Louis 10, Mo.

The only dry type Electronic Precipitator

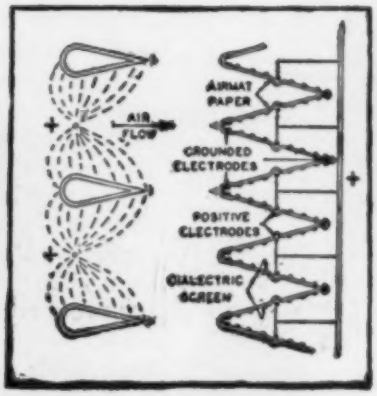
AAF

Electro-AIRMAT

Introduces an entirely new principle in electronic precipitation combining the advantages of both electronic and mechanical air filtration in a single compact light-weight unit.



The three components of the Electro-Airmat precipitator are the Ionizer, Airmat Collector Element and Frame.



Cross Section diagram showing Ionizer for charging dust particles and pleated arrangement of charged Airmat paper.

Rear view of Collector Element showing method of applying electrical potential to Airmat Collector Element.

The ELECTRO-AIRMAT, in which the collector element is electrostatically charged Airmat paper, is not only more efficient but affords positive protection against dust infiltration under any operating conditions including power failures.

Maintenance of the Electro-Airmat is simple and positive requiring only the replacing of the Airmat paper when its full dust load is reached. Installation is easy—no water connections, no sewer drains. It requires 30% less floor area and weighs 40% less than precipitators having metal plate collectors.

Two standard arrangements are available—the Straight Bank shown at top of page and the "V" arrangement at left which offers space economy and lowers power consumption. The Complete Electro-Airmat story is contained in Bulletin No. 253—available without obligation. Write

AMERICAN AIR FILTER COMPANY, INC.
373 Central Avenue, Louisville 8, Kentucky
IN CANADA, DARLING BROS., LTD., MONTREAL, P. Q.

AT-A-GLANCE OIL GAUGE

EASY TO READ from ANY DIRECTION

NON MAGNETIC NO SPRINGS

NO GEARS NO CAMS

PERFECT VISIBILITY

Check the exclusive features of "At-A-Glance" oil gauge and you will see why it is preferred by dealers and consumers alike. Its perfect visibility that permits easy reading from all directions, "At-A-Glance" is just one of its exclusive patented features. Here is a gauge that is a combination that produces a clear reading, leakproof top, completely protected against destruction or deterioration by shock, heat, flame, or fumes. It is designed and made with a double enclosure of plastic. The calibration assembly prevents oil from seeping into the calibration dome

No magnets or springs are used, guaranteeing dependability at all times.

No gears, cams or intricate mechanism to cause trouble or wear out. Its construction is as simple as possible for accuracy. "At-A-Glance" gauge is a simple lever action that moves the indicator disc up or down as the contents in the tank are raised or lowered.

Easy to install in all basement tanks, even when partially full. No adjustments are necessary. "At-A-Glance" gauges are constructed at the factory to fit all tank sizes according to individual specifications.

* Trade Mark Registered

You're not only safe with "At-A-Glance" gauge, but once installed there is nothing to require attention from you or your customer. "At-A-Glance" gauges are distributed by leading jobbers in the United States, Canada and Mexico.

AT-A-GLANCE GAUGES are listed as standard by UNDERWRITERS LABORATORIES

Write FOR COMPLETE DETAILS . . .

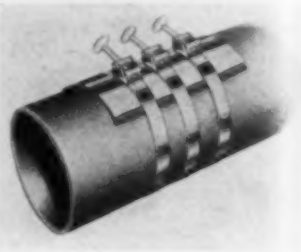
KRUEGER SENTRY GAUGE CO.

GREEN BAY, WISCONSIN

Stainless Steel Used in Pipe Leak Clamp

No. 3343—Marman Products Co., Inc., 940 W. Redondo Blvd., Inglewood, Calif., has announced an all stainless steel pipe leak clamp.

Consisting of a "Hycar" pad, designed for resistance to the corrosive action of water, oil, gasoline, etc., an annealed backing plate which can be hand-formed to the desired pipe contour, and stainless steel clamps of the continuous band type, units are designed to fit pipe diameters from ½ to 12 in. with larger sizes available on request. The clamps are said to have been tested without leaking at pressures exceeding 240 psi.



Revolving Unit Heater Features Turbine Drive

No. 3344—L. J. Wing Mfg. Co., 154 W. 14th St., New York 11, N. Y., has announced a new downward discharge unit heater of the revolving outlet type containing a turbine-driven fan.

Steam, at almost any pressure, is used to drive the small all-steel turbine and is then piped to the finned heater coils. Condensate from the unit is said to be less than 170 F, even with air inlet temperatures as high as 100 F and condensate is returned to the boiler through an open return system. The design of the unit is such that there is said to be no back pressure on the turbine, thus eliminating the need for traps and extra piping. Capacities of the three sizes listed range from 132,000 to 274,000 Btu per hr (operating on steam of 10 psi or higher pressure) and when used with steam pressures lower than 10 psi, the units will operate at reduced capacities.

Plug Seals Tanks and Vessels During Hydrostatic or Pneumatic Testing

No. 3345—Mechanical Products Corp., 168 N. Ogden Ave., Chicago 7, Ill., has announced the development of the "Hydro-Matic" self-sealing test plug for use in closing openings in tanks, boilers, or other vessels requiring hydrostatic or pneumatic internal pressure tests.

According to the manufacturer, these plugs are adaptable to any type of spudded, flanged, or drawn opening, either plain or threaded, are available from stock for ½ in. to 2 in. standard pipe thread openings, and are suitable for testing pressures up to 500 psi. They are designed for quick insertion and removal, and utilize the testing pressure within the tank to hold the seal against its seat. The accompanying illustration shows a plug being applied to an opening.

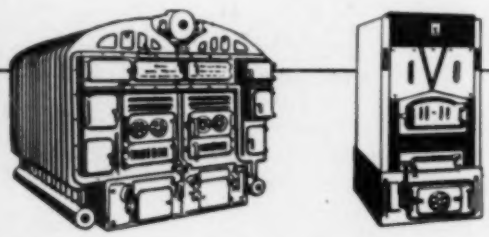
"Looks like we're ALL for Cast Iron"

When professionals discuss the best type of boiler for any job, they agree upon *cast iron*. Leading architects, engineers and contractors know that it's a recommendation they can make with confidence. For experience has taught them these important facts about cast-iron boilers:

They're a sound investment in long-term satisfaction . . . they resist corrosion and rust indefinitely . . . they are easily installed, maintained, replaced . . . they deliver high efficiency, low operating cost.

The professionals also agree on the leadership of H. B. Smith Boilers in the cast-iron field . . . for every commercial, industrial, institutional and residential installation . . . for all fuels and fuel-burning methods. Again — experience has confirmed their judgment.

Write today for your free catalogue of H. B. SMITH *Cast-Iron* Boilers.

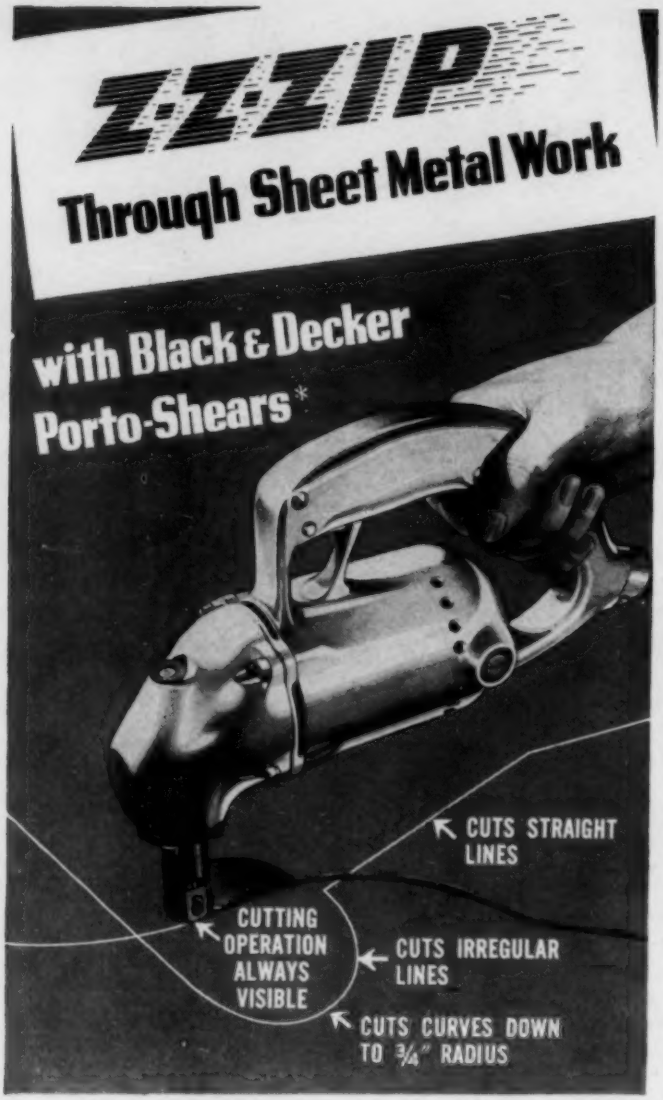


Visit our Exhibit at the 7th International Heating and Ventilating Exposition, Lakeside Hall, Cleveland, Ohio, Jan. 27-31, 1947.

H.B. Smith

CAST-IRON BOILERS

THE H. B. SMITH CO., INC., WESTFIELD, MASS. **Offices and Representatives in Principal Cities**



Black & Decker Electric Porto-Shears cut sheet metal too tough for snips, speed up jobs where snips are slow. Fast, powerful shearing action eliminates hard muscular strain. Easy to follow patterns because cutting operation is always visible. B & D 16-Gage Porto-Shears cut up to rated capacity in steel or galvanized iron; about one gage thinner in Monel or stainless; 50% above rating in copper, aluminum, lead and other non-ferrous metals.

For full information on cost-cutting Porto-Shears . . . and other Electric Tools for heating, piping and air conditioning work . . . see your nearby Black & Decker Distributor. For your free copy of our complete catalog, write to: The Black & Decker Mfg. Co., 628 Pennsylvania Ave., Towson 4, Maryland.

*Trade Mark Reg. U. S. Pat. Off.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS

See our exhibit at the
7th INTERNATIONAL HEATING and VENTILATING EXPOSITION
Lakeside Hall, Cleveland, Ohio January 27 to 31, 1947

Porcelain Lining Applied to Tanks to Prevent Corrosion

No. 3346—Elastic Porcelain Lining Corp., 42 East Ave., Rochester 4, N.Y., is the national distributor of a ceramic lining which is applied to both new and old tanks for preventing corrosion.

Used in sprinkler storage, water softening, condensate, filtering, and many types of acid tanks, the lining is applied in the form of a plastic mortar. The material is said to adhere readily to iron and steel, to have a similar coefficient of expansion, to be self-curing under water, to withstand temperature ranges from freezing to 230 F, to be entirely inert, and to retard the formation of lime scale.

When applied to old tanks, it is not necessary to make special preparations or to disconnect the tank. According to the company, out of service time is not more than 48 hr.

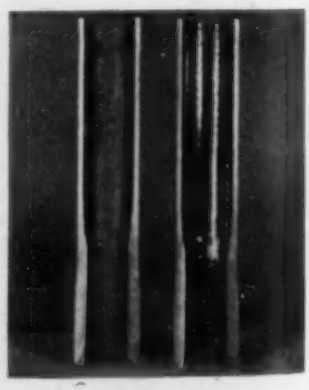
Packless Expansion Joint Designed to Handle Offsets

No. 3347—A standard line of offset joints of the packless expansion type has been announced by Cook Electric Co., Magnilastic Div., 2700 Southport Ave., Chicago 14, Ill.

Designed for all piping conditions and available in sizes from ½ to 24 in., the joint is constructed with an equal number of expansion flanges on either side of an insert section. The length of the unit and the number of flanges are determined by the misalignment condition to be corrected. In addition to providing a means for joining pipe that is out of line because of accumulated excess tolerances in piping sections, settling and shifting at anchor points, thermal expansion or contraction, and variations in operating conditions, the joint is said to protect valves, headers, and fittings from undue strain and tension.

The standard series is available for pressures from vacuum to 1000 psi and for temperatures from -300 F to 1600 F. Joints of stainless steel, monel, inconel, and copper are offered and end fittings are available in welding end or Van Stone bolted flanges.

Plastic-Coated Steel Pipe Resists Corrosion



No. 3348—Spang-Chalfant, Div. of National Supply Co., Grant Bldg., Pittsburgh 30, Pa., has developed a plastic-coated steel pipe resistant to corrosive conditions such as are often encountered in oil well drilling.

According to the manufacturer, unique properties of the coated pipe make it suitable for many applications in industry, including home and industrial construction, and the company is continuing its research to develop the coating process for many types of industrial piping.

It was developed originally for protecting pipe while drilling oil wells in highly corrosive oil fields, and consists of first shot-blasting the inside of the pipe which is then upended in a rack with the liquid plastic being forced up the inside of the pipe. The plastic is then drained slowly, and after a short drying period at normal temperature, the pipe is placed in an oven and the plastic is baked on. Four successive coatings of the plastic are baked on the pipe. Shown here at the left is a view of the pipe as it comes from the mill and at the right the finished inside coating of plastic is shown.

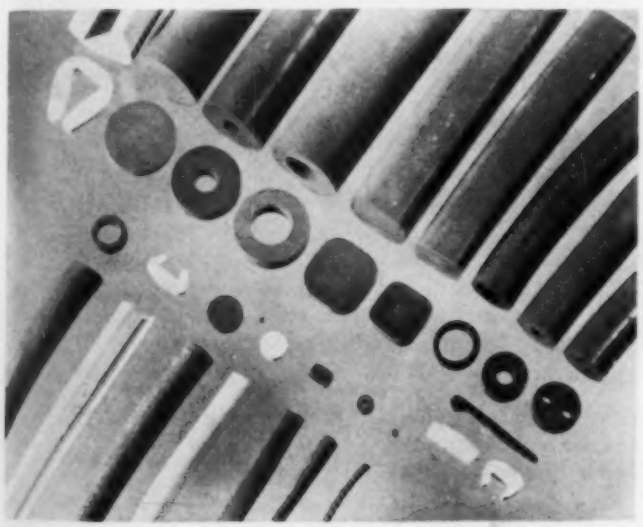
Return Air Cools Motor, Compressor on New Air Conditioning Unit

No. 3349—Ranging in sizes from 3 to 15 hp, "Ameri-Therm" air conditioning units, which are designed for both self-contained and remote installations, are offered by American Thermal Industries, Inc., 440 Illinois Ave., Detroit, Mich.

The manufacturer states that one of the unique features of the unit consists of drawing return air through the motor compartment in the lower section before it passes through the cooling coil. This is said to provide better cooling of the compressor, motor, and liquid receiver, and also to make possible the use of full size filters. An eliminator plate is located below the cooling coil to handle the condensate, and all moving parts are isolated from the frame. Easy accessibility of all component parts is said to be provided, and optional winter operation may be obtained by the addition of hot water or steam heating coils.

New Applications Found for Silicone Rubber

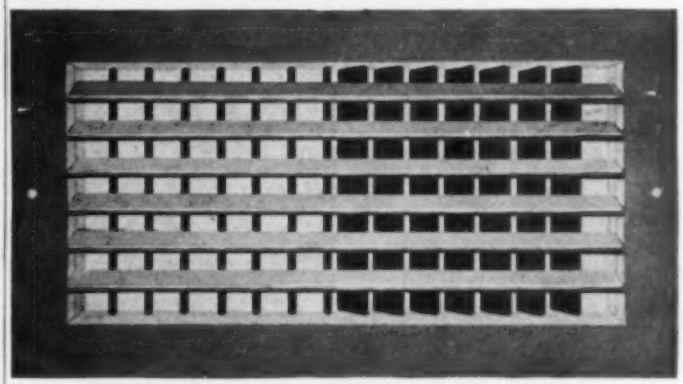
No. 3350—The use of silicone rubber gaskets in high temperature equipment such as diesel engines, gas turbines, and air compressors is among the many new applications for this silicone material announced by General Electric Co., Chemical Dept., Pittsfield, Mass.



Advantages of this material, says the manufacturer, include its ability to remain soft and resilient at high operating temperatures, its low permanent set, and its nonadherence to metals. It is said to be virtually unaffected when subjected to temperatures ranging from —55 to 520 F, to combine excellent chemical and moisture resistance, and to be a good electrical insulator.

The material is available in extruded shapes, molded parts, sheet stock, and fabricated stock.

HIGH VELOCITY OUTLETS



HIGH VELOCITY OUTLET

Adjusted for Down Throw and to One Side

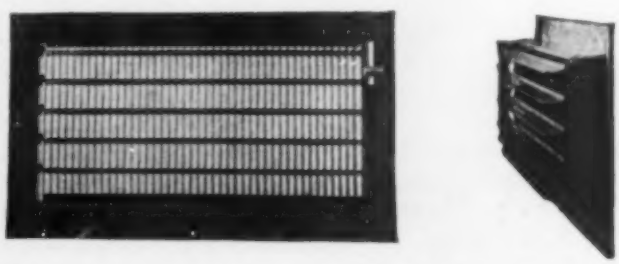
Style "DDH" illustrated above is one of eight variations of our high-velocity outlet—each bar individually adjustable with key furnished—with or without volume valves. Supplied with baked prime coat and sponge rubber gasket.

This is a heavy, attractive outlet made in all sizes, with matching fixed-bar down-deflecting return grille. Prices are competitive.

Prompt shipment of this line is available.

MANUFACTURERS OF ROOM COOLERS

We are in a position to supply variations of the High Velocity Outlet illustrated above, curved to follow the contour of your cabinet, or straight. Your inquiry is invited for prompt, helpful information.



Style 74—Register—Wall or Baseboard. This Register utilizes 1" multiple-dampers to control volume and vertical direction. Multiple dampers may be set so as to obtain up, straight, or down deflection, as well as complete shut-off. The face is the same as all others of the "70" line—permitting air reflection right or left by adjusting front blades with key furnished. Blades are ¼" center to center, and ¼" in depth. Complete with rubber gasket, screw holes, prime coat. This is an attractive, well-constructed register, available promptly.

For Immediate quotation and literature, Ask for Bulletin H1.

STEWART MANUFACTURING COMPANY
INCORPORATED
BLOOMFIELD, N. J.

● Least possible bother when you thread pipe with these smart little RIDGIDs. Die heads snap into ratchet ring from either side, can't fall out. No special dies needed for close-to-wall threads. Heat-treated tool-steel dies for clean smooth threads. No. 00R, 1/8" to 1"; No. 111R, 1/8" to 1 1/4". Ask for these efficient durable small RIDGIDs at your Supply House.

Free handy carrier for any group of sizes.

RIDGID

WORK-SAVER PIPE TOOLS

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

Announces Plans for Expansion Program

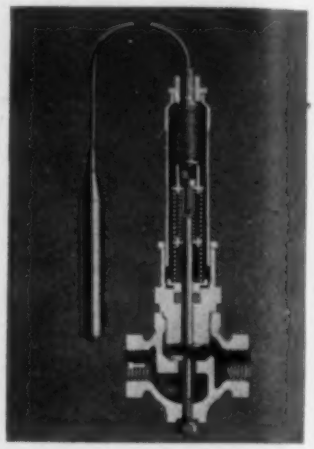
No. 3351—The Aldrich Co., Wyoming, Ill., has announced plans for a building expansion program and greatly increased production of oil burners and boilers.

Production schedules call for 100,000 oil burners in 1947 and between 15,000 and 20,000 steel boilers during the same period.

Completion of the current building program will provide some 150,000 sq ft of additional factory area, and the first of three new buildings was scheduled for occupancy by January 1. One of the new buildings will be used for the production of electric motors and transformers and the other two will be used to expand the production of steel boilers.

The company expects to announce, in the near future, a new oil burner constructed of 10 gage pressed steel which will have nearly the same weight as conventional cast iron burners.

Temperature Regulators Are Self-Contained



No. 3352—A new type of self-contained, direct operated temperature regulator for gas control in process heating, designated as Class MG-2, has been announced by the Leslie Co., 51 Delafield Ave., Lyndhurst, N. J., manufacturers of regulators, controllers, strainers and whistles.

Supplied with screwed ends in 3/8, 1/2 and 3/4 in. sizes, these bronze body temperature regulators operate over standard temperature ranges from 20 to 600 F, at inlet pressures up to 25 psi maximum. They are designed for numerous applications including hot water heaters, oil treaters, industrial baking ovens, cookers, drying ovens, steam tables, and similar equipment where accurate gas-fired control is desired.

All trim is bronze, with renewable valve disc and stem assembly. Various bulb and bulb casing materials are available and the liquid expansion type thermostatic element has a piston guided bellows. A free moving valve stem has yielding springs which prevent overstressing of bellows at "over range" temperatures. An unexposed pressure sealed stuffing box is designed to prevent unauthorized tampering with the regulator.

Improved Breathers Now in Production

No. 3353—Pittsburgh Lectrodryer Corp., P. O. Box 1766, Pittsburgh 30, Pa., is now producing an improved line of breathers designed to reduce corrosion and contamination in industrial storage tanks.

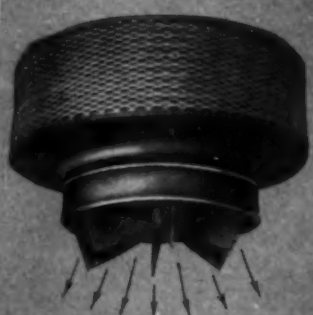
These "Lectrobreathers" can either be mounted directly over the vent of a tank or be piped to it. Incoming air is dried by its passage through activated aluminas contained in the breather. Since the air exhaled by the tank is relatively dry, it is said to have a partial reactivating effect, thus making possible long

McCORD
HEATING AND AIR CONDITIONING PRODUCTS

BLAST HEATING COILS—AIR CONDITIONING COILS—ALL TYPES

All copper spiral fin tube construction with the tubes formed or bent permits uniform expansion without strain. Headers are heavy wall construction with tubes brazed into extended ferrules formed in the headers. Fins are helically wound and metallically bonded. May we send catalog?

VERTICAL TYPE UNIT HEATERS



A proven heating unit, modern in design, incorporating every unit heater advancement. McCord copper spiral fin tube construction creates air turbulence without undue restriction. Improved fan blades deliver large volume of air with minimum air noise. Guaranteed for 150 lbs. saturated steam pressure. Specify McCord.

HORIZONTAL TYPE UNIT HEATERS

A time proven heating unit, modern streamlined in design, quiet, yet its rugged construction adapts it to all types of installations, guaranteed for use on No. 150 p. s. i. steam pressure. All copper heating element, individual spiral fin tubes free to expand without strain on joints. Standard motors with standard bases used. Wide range of capacities.

Save fuel with McCord Unit Heaters.

McCord CORPORATION
DETROIT 11, MICH.

Guaranteed PIPE WRENCH ECONOMY

No wrench housing repair bother or expense with the sturdy efficient

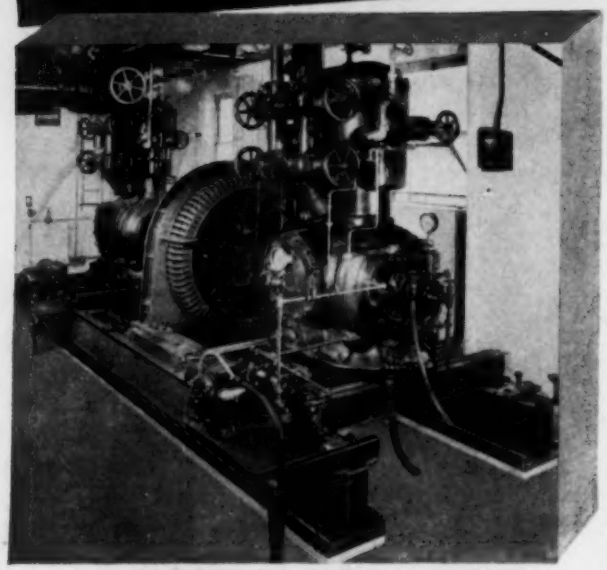
RIGID

● So strong, efficient and trouble-free it's no wonder millions of users prefer it. And economical—that guarantee saves you all wrench housing expense and bother. Easy-spinning adjustment nut—in all sizes, 6" to 60". Positive-action jaws, handy pipe scale on hookjaw, comfort-grip handle. For top wrench value buy work-saver RIGIDs—at your Supply House.

End pattern for pipe in coils, against flat surfaces.

RIGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL COMPANY • ELYRIA, OHIO

KORFUND VIBRATION CONTROL
FOR
Compressors
And All Other
Air Conditioning Equipment



Korfund Vibration Controlled installation on the fourth floor of a large department store.

Air conditioning equipment is installed to provide comfortable working and living conditions. In consequence, Vibration Control is a "MUST," where machinery noise and vibration are most irritating and undesirable. Korfund Vibration Control units reduce noise and vibration transmission so effectively that persons in the building cannot tell when the equipment is operating.

On *all* air conditioning installations, Korfund does a two-fold job. First, it eliminates the disturbing operating noise. And second, Korfund prevents vibration transmission that can be both annoying and dangerous to the building structure.

The Korfund Co., Inc., is now sole distributor of Armstrong Standard Density Vibracork. Write for details.

Korfund offers you Engineering Service with over forty years' experience in Control of Vibration. Write today about your vibration problems.

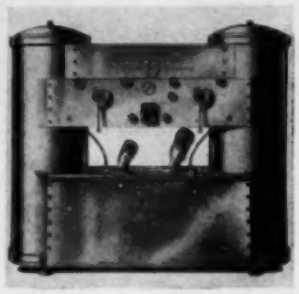
KORFUND
VIBRATION
CONTROL
THE KORFUND COMPANY, Inc., 48-38 32nd Pl., LONG ISLAND CITY 1, NEW YORK

periods between reactivations of the breather which is equipped with a color indicator.

Package Unit Demineralizer

No. 3354—A line of four package unit demineralizers designed to provide industrially pure water has been announced by the Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, Pa.

The units are designed for plug-in operation on 110 volt, 60 cycle current and are finished along the lines of modern refrigerators. According to the manufacturer, operating costs are a fraction of distillation costs, and all steps of the operation are performed and all results are observed from a position in front of the panel. Chemical tanks are also charged from this position and all control valves and instruments are located on the panel at eye level. Various reaction materials are used the choice depending on the raw water and effluent requirements for the particular application.



Flat Belt Drive Pumps Have New Shifter, Other Improvements

No. 3355—Several improvements in the company's flat belt drive, rotary pumps have been announced by Blackmer Pump Co., 1920A Century Ave., S. W., Grand Rapids, Mich.

The newly designed combination bracket and belt shifter is of one piece, heavier construction. It supports the pulley end of the pump shaft in a bronze-bushed bearing and the improved rigidity is said to prolong bearing life and maintain better shaft alignment.

Lighter weight and greater strength are said to be provided by the use of a structural steel base having transverse trusses in lieu of the former cast iron base.

These improved pumps are supplied with removable liners for abrasive liquids or with steam-jacketed heads for viscous liquids. Pump capacities range from 10 to 750 gpm at pressures up to 100 psi.

Opens Additional Factory

No. 3356—A new factory building, to be used for the fabrication and assembling of the company's line of controls, has been leased by the Penn Electric Switch Co., P. O. Box 556, Goshen, Ind.

This latest acquisition, located at 1351 Roosevelt Ave., Indianapolis, boosts the company's total to three factories; the second having been put into operation in Toronto, Canada last January. This recent addition is said to be but another step in the company's expansion program which is designed to facilitate service and deliveries to customers using automatic controls for heating, refrigeration, air conditioning, pump and compressor applications, as well as safety controls for internal combustion engines.

"Make Hay While the Sun Shines"

Statistics show that millions of homes and institutions are to be built . . . millions of plumbing systems installed . . . billions of ells, tees and unions used in the years that lie ahead.

That is the plumber's and contractor's golden opportunity to "make hay while the sun shines." Installations that go in smoothly, without waste of time, and with callbacks held to a minimum mean money to the busy contractor and plumber. That's a sound reason why only the highest grade materials . . . the highest grade fittings . . . should be used. "K" fittings make up fast and pull tight. They cause less trouble than ordinary fittings because they are precision cast and thoroughly inspected. Standardize on "K" fittings and save the profits less far-sighted operators dissipate on fittings that so often fail.

COMPLETE LINE. CATALOG ON REQUEST

Standard and extra heavy cast iron screwed fittings.
Standard flanged fittings.
Standard and extra heavy companion flanges.
Drainage fittings.

"K" fittings carried in stock at Malleable Iron Fittings Company, Branford, Conn.; M.I.F. stocks at Kuhns Bros. Co., Dayton, Ohio.

KUHNS BROTHERS CO.
DAYTON 7, OHIO

VULCAN BASEBOARD . . for Uniform Heating Comfort

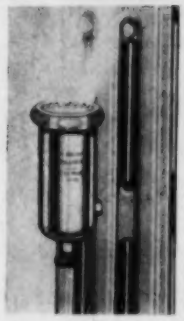
Vulcan Baseboard (Radi-Vector) combines radiant and convection heating at the base of cold walls to actuate gently circulating warm air throughout the room area. Because of Vulcan's compact construction, room space is conserved for neat appearance and greater room utility. Both hot water and two-pipe steam heating systems are equally well served. Send for bulletin No. 50 for full installation details. Sketch at right shows metal backing, finned heating unit and removable grille cover.

Representatives in principal cities.

PAT. APPLIED FOR.

THE VULCAN RADIATOR CO.
26 FRANCIS AVENUE HARTFORD 6, CONN.
RADIATOR MANUFACTURERS FOR OVER TWO DECADES

don't let LACK OF HUMIDITY spoil your heating jobs!



No. 95 AUTO-VENT installed on steam radiator in place of the usual air valve.

Use AUTO-VENT
AUTOMATIC HUMIDIFIER
on low pressure steam systems

"IT EVENTS AS IT HUMIDIFIES"

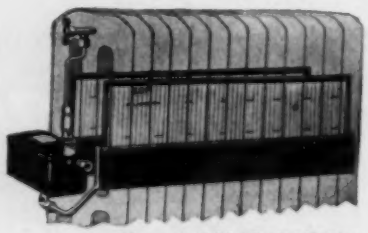
Discharges one pint of water vapor per hour at one lb. steam pressure—sufficient humidity for 2,000 cu. ft. of space. Easily regulated—noiseless in operation. To install, remove air valve and screw in AUTO-VENT.

Made entirely from non-ferrous metals—lasts indefinitely. Nationally advertised—thousands now in use giving perfect satisfaction.

★ ★

on hot water or steam radiators use

Ol' Faithful
AUTOMATIC HUMIDIFIER



No. 34 OL' FAITHFUL HUMIDIFIER installed on hot water radiator.

Equipped with patented copper bound, corrugated evaporators which vaporize as much as 1½ gal. of water daily at hot water radiator temperature of 130°—capacities 20% greater on steam radiators. Water line automatically maintained. Easily installed.

Supply water can be taken directly from hot water radiator, or on steam radiator from nearest water line. Made in three sizes: 18", 24" and 36" lengths. Furnished complete as shown.

use our
CONVECTOR
Automatic Humidifier
for all types of Warm Air Furnaces and Winter Air Conditioning Systems . . . MAID-O'-MIST also manufactures Water Line Control Valves and other high grade Heating Specialties.

★ ★ ★

WRITE TODAY for engineering data and prices on entire MAID-O'-MIST line . . . SEE OUR EXHIBIT—at Cleveland Air Conditioning Show, Booth 441.

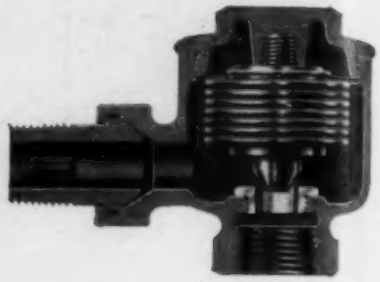
MAID-O'-MIST INC.
3215 N. PULASKI RD.
CHICAGO 41, ILLINOIS

AUTOMATIC HUMIDIFIERS FOR ALL TYPES OF HEATING SYSTEMS

Low Pressure Radiator Trap Features Large Valve Orifice

No. 3357—W. H. Nicholson & Co., 198 Oregon St., Wilkes-Barre, Pa., offers a new low pressure radiator trap for use in vapor and vacuum steam heating service.

The trap is of the thermostatic type and incorporates a bronze bellows, a nickel alloy valve, and a stainless steel valve seat. The body, cap, and union are of brass with a dull nickel-plated exterior finish.



The manufacturer states that the unit features a large diameter valve orifice for maximum water and air discharge capacity and that for pressures from vacuum to 25 psi, the orifice need not be changed or adjusted. It is furnished in two types, for 200 and 400 sq ft EDR.

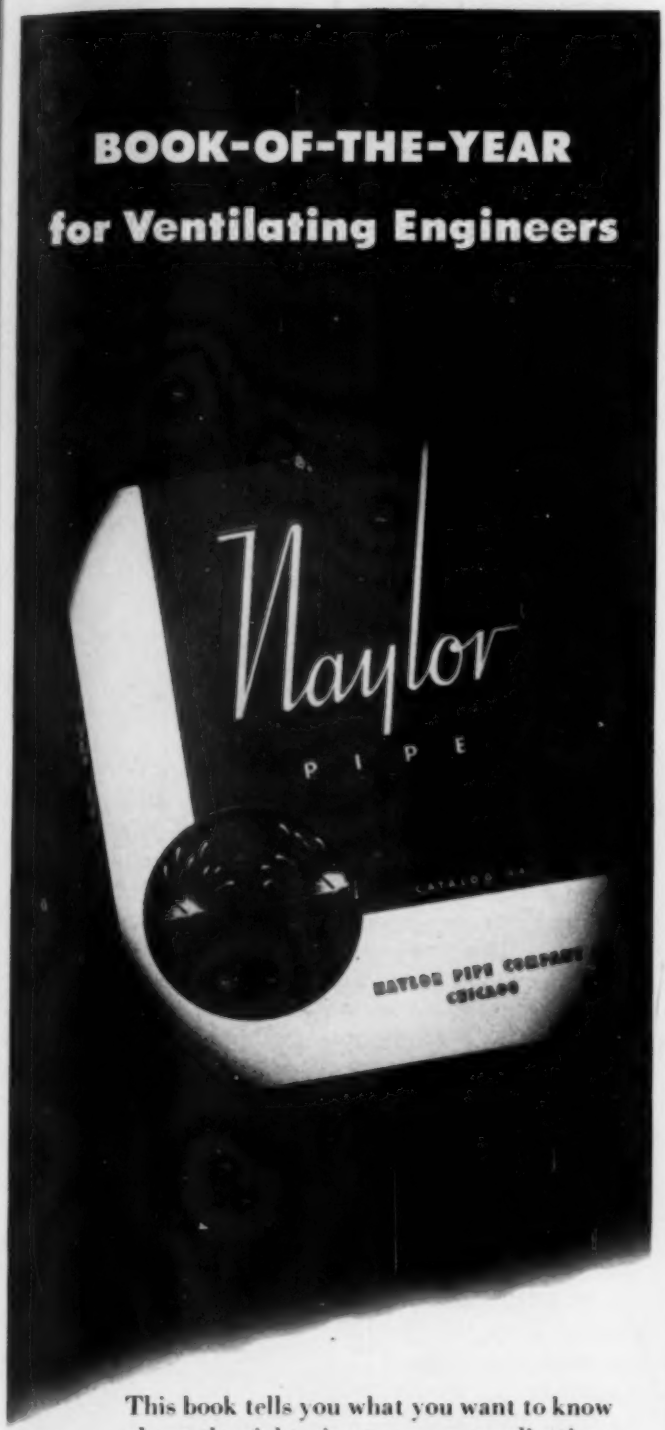
Industrial Photoelectric Control

No. 3358—Series 20 and 21 photoelectric controls, designed for general industrial and machinery applications, are offered by Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.

Because of many unique features, these controls are said to be adaptable to a wide variety of industrial applications. The phototube, which must be located at the point where operations are being observed, is available either integral with the housing or in a small separate housing. A tamperproof sensitivity adjustment is provided on the control housing to permit positive operation over varying distances between the phototube and the light source. Hermetically-sealed, oilfilled condensers and high wattage resistors are used throughout.

Units are recommended for such applications as counting, conveyor control, production inspection, short range signal systems, motor or valve control, machinery safeguards, and automatic control for many specialized industrial processes. The unit is designed for high speed operation with the relay operating in 1/20 sec. The maximum operating distance is 20 ft and the relay will operate at any predetermined level of illumination within the range of 10 to 50 foot candles. The control unit is designed for use with 115 or 230 volt, 50-60 cycle, a-c current. The double pole, double throw relay is rated at 10 amp, 115 volt, a-c or 5 amp 230 volt, a-c noninductive and ½ hp 115/230 volt a-c with both poles in parallel.

BOOK-OF-THE-YEAR
for Ventilating Engineers



This book tells you what you want to know about the right pipe to use on applications like these: High and low pressure air lines, ventilating lines and exhaust and intake piping. Write for your copy today.

Naylor

NAYLOR PIPE COMPANY

General Office
1251 EAST 92nd STREET • CHICAGO 19 • ILLINOIS

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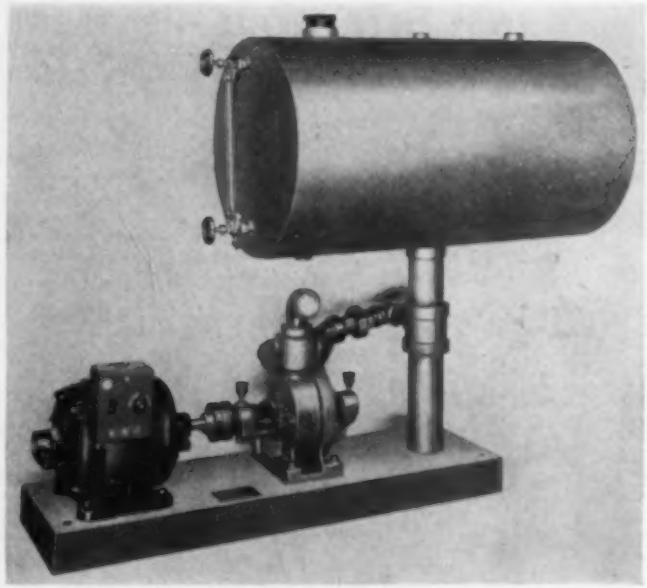
350 MADISON AVENUE • NEW YORK 17 • N.Y.

BOILER FEED PUMPS
for
LAUNDRIES
and
DRY CLEANERS



THE EAGAN
MIGHTY MIDGET
Bulletin 7

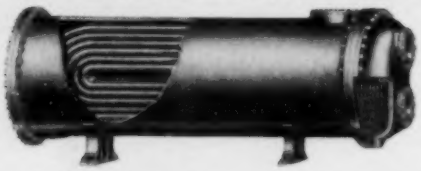
- **Handles Up To *10 B.H.P. at 100 P.S.I.***
- **Turbine Pump has Renewable Bronze Liners, two Outboard Ball Bearings, Flexible Coupling.**
- **Inlet Economizer Tube, Make Up Valve, Strainer, Level Gage, Thermal Overload Protector and Three Position Hand-Off-Automatic Switch and 25 gallon Tank included.**
- **Standard Units for Boilers to 750 H.P. Condensate and Vacuum Pumps.**

Check Your
Jobber's Stock,
or Write:

WALTER H. EAGAN CO.
2336-38 FAIRMOUNT AVENUE, PHILADELPHIA PA

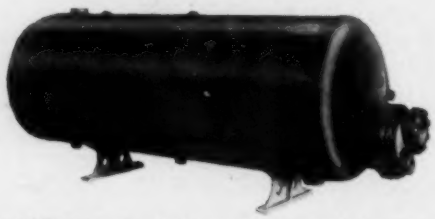
WHITLOCK
HEATING AND COOLING Equipment

✓ **INSTANTANEOUS HEATERS**



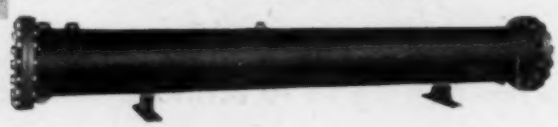
For use where hot water at a nearly uniform rate is desired. Type R shown has a removable U-tube bundle; other designs are available. Write for Bulletin 20.

✓ **STORAGE HEATERS**



Type K Storage heaters supply ample hot water at all times. Whitlock-Everdur construction assures lifetime service: Also made in Eterno and Standard Steel. See Bulletin 40.

✓ **FUEL OIL HEATERS**



Preheating promotes efficient atomization and burning. Type V-1 Heater shown is easily cleaned without breaking line connections. Whitlock heaters are made in a wide range of types and sizes. Ask for Bulletin 35.

✓ **WATER CHILLERS**

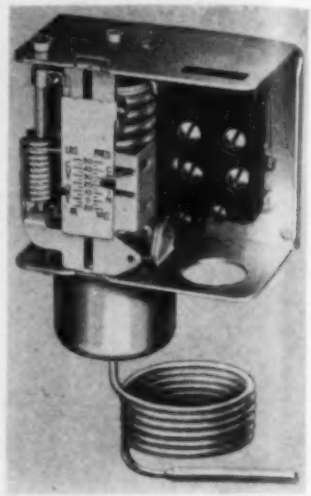
For Air Conditioning service Whitlock chillers are built to meet specific job requirements. The dry expansion cooler illustrated is of U-bend design; refrigerant passes through the tubes and cools water in shell —thus less refrigerant is required and danger of freeze-ups is greatly reduced. Ask for recommendations. Whitlock Engineering Service is complete — Bring your heating or cooling problems to us.

THE WHITLOCK MANUFACTURING COMPANY
44 SOUTH STREET, ELMWOOD, HARTFORD 1, CONNECTICUT
NEW YORK • BOSTON • CHICAGO • PHILADELPHIA • DETROIT • RICHMOND
Authorized representatives in other principal cities.
In Canada: DARLING BROTHERS, LTD., MONTREAL
ESTABLISHED 1891 — AHEAD OF THE TIMES FOR HALF A CENTURY

Refrigeration Control Has Two Pole Construction

No. 3359—Penn Electric Switch Co., Goshen, Ind. has introduced the Series 270 refrigeration temperature and pressure controls which feature two pole construction and are suitable for both single and dual control of low side temperature.

The two pole construction, says the manufacturer, provides for (1) control of polyphase motors (where protection against single phasing is provided) without the use of line starters, (2) the control of single phase multiple systems or polyphase systems when one pole is used as a pilot control, (3) breaking the hot line when wired as a two pole switch in single phase circuits, and (4) the control of two separate load circuits such as two speed fans.



Purchases Manufacturing Company

No. 3360—The capital stock of the Peerless Mfg. Corp., Louisville, Ky., has been purchased by G. L. Ohrstrom & Co., 40 Wall Street, New York.

The purchase was made for investment purposes only and not for resale; there will be no combining with other companies. Ohrstrom plans to expand the manufacturing facilities and line of gas-fired heating equipment, fireplace fixtures, automatic coal stokers and building specialties. According to a recent announcement, there will be no change in the management or policies of Peerless.

Bronze Flexible Tubing Has "Floating" Flanges

No. 3361—Flexible seamless bronze hose with "floating" flanges is offered by the Seamlex Co., Inc., 41-23 24th St., Long Island City, N. Y., for protection against expansion of adjoining pipe lines and vibration of adjacent equipment.

The hose shown here is 2½ in. I D by 18 in. long and is designed for conveying gas under 200 psi internal pressure at a temperature of 200 F. According to the manufacturer, the important feature is the simplicity of the end connections which consist of only two parts. The bronze seat for the flange is cast and extends backwards to form a sleeve which holds the braided flexible tubing externally. The tubing is held internally by a patented triple seal, solder joint. The flanges are of open hearth steel, 300 lb American standard drilling, and the inner bronze tube is of the close pitch corrugated type, reinforced by a bronze braid jacket.

Milvaco Gate Valve (Non-Rising Stem) No. 401

MILVACO

Means the Most in Valve Value!

• *Ruggedness and reliability*—these are the quality factors which have earned for Milvaco a ready acceptance and respected name among users of valves. Offering a complete line of bronze valves in a wide variety of sizes, Milvaco today stands as a symbol of unfailing dependability.

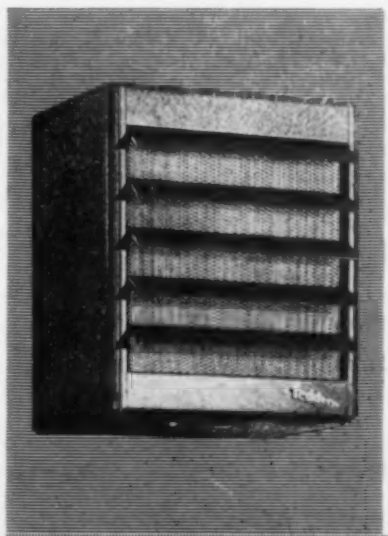
MILVACO

MILWAUKEE VALVE COMPANY
MILWAUKEE 7, WISCONSIN

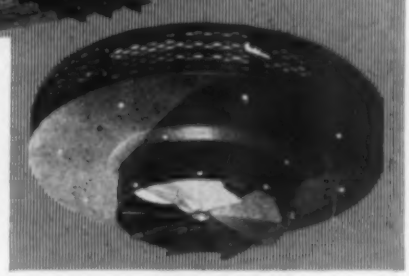
fedders

HORIZONTAL DOWNBLOW *Unit Heaters*

Fedders Series 15 Horizontal Type Unit Heaters built in 100 to 1000 EDR capacities.



Fedders Series 12 Downblow Unit Heater at left. Used for medium ceiling heights of 15 to 25 ft.



Series 12 Downblow Models shown at right for 20-45 ft. ceiling heights.

The unit heaters illustrated are typical of the wide range of horizontal and downblow types for normal and high ceiling installations. They are designed to produce comfortable heating conditions, resulting from proper final temperatures, maximum air volume and a great degree of quietness. Write for catalogs.

Booths 281 & 282 at the Cleveland Show.

FEDDERS-QUIGAN CORPORATION

BUFFALO 7, N. Y. *Heat Transfer Specialists Since 1896*

RECENT TRADE LITERATURE

For your convenience in obtaining copies of these bulletins, see coupon on page 191. If you write direct to the manufacturer, describe carefully what literature you want, as the number given first in each item is for use only when sending requests to Heating, Piping & Air Conditioning.

Air Diffusers on Unit Heaters

No. 6377—The Vol. 2, No. 6 issue of the house organ published by the Anemostat Corp. of America, 10 E. 39th St., New York 16, N. Y., features a discussion of the use of the company's special air diffusers for projection type unit heaters. Also included is a brief article on the fundamentals of fluid flow in ducts.

Air, Gas, and Liquid Filters

No. 6378—A 45 page booklet on filtering has been published by the Drico Industrial Corp., 29 Broadway, New York 6, N. Y. After considering general fields of application, the purpose of various types of filters, and after defining filter efficiency, the use of the company's filters in air conditioning, on internal combustion engines, in compressed air systems, and in pipe lines handling liquids and gases is presented.

Aluminum Casting Alloys

No. 6379—Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y., has released a 44-page booklet on aluminum casting alloys. In addition to giving data on the company's products, a good deal of fundamental information is given on the effect of copper, silicon, magnesium, etc. There are also chapters on heat treatment, aging treatment, laws of gas absorption, gas removal, shrinkage, cracks, etc.

Arc Welding Electrodes for Low Base Metal Temperatures

No. 6380—Eutectic Welding Alloys Corp., 40 Worth St., New York 13, has issued a catalog on the new "Low-Temp EutecTrodes" for welding cast iron, stainless steel, copper, and aluminum alloys. The electrodes, which are also designed for hard facing, are said to permit welding at relatively low base metal temperatures.

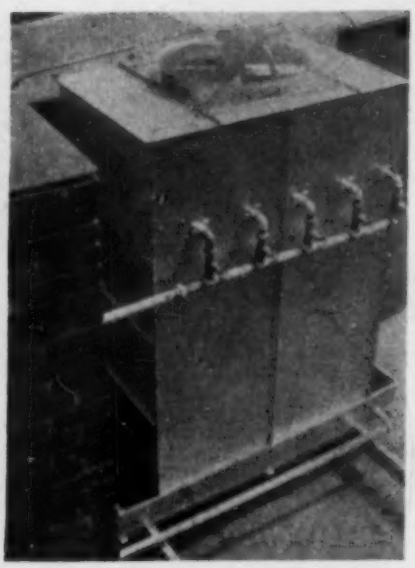
Boiler Tube Expanders

No. 6381—The line of boiler tube expanders offered by Richard Dudgeon, Inc., 24 Columbia St., New York 2, N. Y., is covered in a new four page leaflet. In addition to brief descriptions and illustrations, tables of sizes are included.

Capacitor-Start Motors

No. 6382—The complete line of capacitor-start motors offered by the Emerson Electric Mfg. Co., St. Louis, Mo., is covered in a new four-page bulletin (No. X5526). Construction details, dimensions, and ratings in accordance with the new NEMA fractional motor standards are included.

TRAY COOLING TOWERS



COOLING TOWER ABOVE—40 Tons Refrigeration Capacity. 120 GPM. Induced Draft—Outdoor Unit.

SAVE 98% of CONDENSER WATER COSTS wasted thru REFRIGERATION and AIR CONDITIONING PLANTS

ATMOSPHERIC UNIT WORCHESTER, MASS.

INDUCED DRAFT COOLING TOWER, PHILA., PA.

INDOOR COOLING TOWER, BROOKLINE, MASS.

TRAY COOLING TOWERS *offer*

★ ALL STEEL CONSTRUCTION
★ PACKAGE UNITS—REQUIRE LESS SPACE
★ OPEN DISTRIBUTOR HEADER — NO NOZZLES requires less horsepower for recirculating pumps.
★ INDOOR and OUTDOOR UNITS

Send for BULLETIN 46

Some open territory for factory representatives

NEW ENGLAND COOLING TOWER CO. 89 Broad Street BOSTON 10, MASS.

DISTRIBUTORS—

This may be the product

you're looking for!

THERMOSEAL Combination Screen and Storm Sash combines all the advantages of screen, storm-sash and weather proofing in one compact unit. The patented, all-metal, adjustable Thermolok* closure frame simplifies installation, adjusts to shrinkage and expansion, eliminates seasonal fitting and provides a permanent weather seal.

The Thermoseal Three-In-One Window Insulation has a ready market. Mr. and Mrs. America are more storm sash conscious than ever before. The wartime fuel situation made fuel conservation a strong habit.

The result is ever-increasing demand for Thermoseal Three-In-One Window Insulation. Thermoseal has already acquired national distribution, is nationally advertised, and enjoys public acceptance.

AN ESTABLISHED SALES APPEAL

Thermoseal Three-In-One Windows have a sales story that really sells—greater comfort, convenience and economy (fuel savings usually pay for the windows in a few seasons) . . . rainproof, draft-free ventilation . . . only seconds to change from screens to storm sash, all from inside the house. There's nothing like Thermoseal Windows on the market. Contain many patented features. Average installations run between $200 and $300, with an attractive profit margin and very little seasonal variation in sales. Big seller in low-cost homes.

Inquiries are pouring in and demand for this product is booming. We have expanded production and are planning further expansion to take care of this huge market.

DISTRIBUTORS INVITED

A limited number of good territories are now available. If you want to obtain a valuable franchise with a live, aggressive organization marketing a fast-selling product, write today for information.

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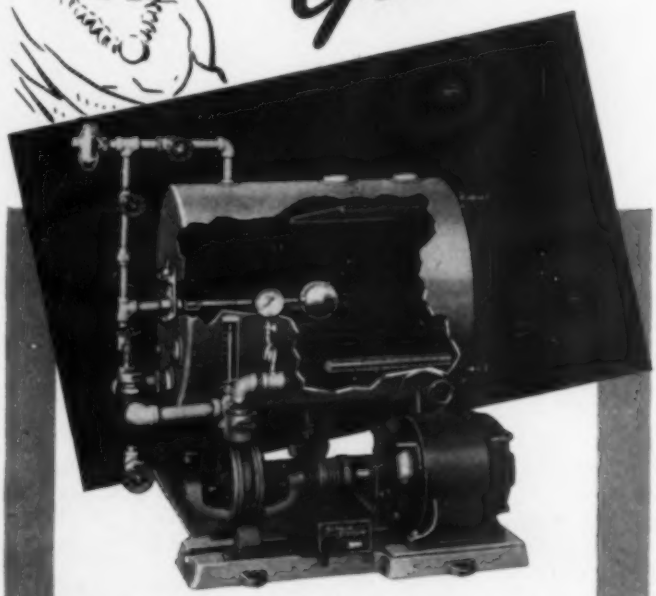

SCHAUB Standard Boiler Return SYSTEM

● When your *boiler* can get back hot condensate (up to 210°), *you* are receiving maximum efficiency and economy from your heating plant. And you add to that advantage when you can maintain a constant water level for uniform steam pressure and steam space in the boiler.

The Schaub Boiler Return System makes this possible. This system provides for:

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3. **Addition of necessary make-up water automatically.**
4. **High and low water fuel cut-off protection, and high and low water alarm.**

All these features mean fuel savings and increased efficiency for your equipment. Don't be without the advantages of the Schaub Standard Boiler Return System.

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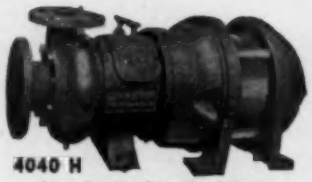
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Centrifugal Pumps
Turbine and Motor Drive Pumps for Handling Most Any Liquids and Service Steam and Power Driven

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Copper, Nickel, Manganese Alloy

No. 6383—"Wyndaloy," the first in a series of hardenable copper, nickel, manganese alloys, containing between 40 and 75 per cent copper, is described in a four-page bulletin issued by Wyndale Mfg. Co., 1203 Cornell Ave., Indianapolis 2, Ind. Chemical and physical properties are given and forms of heat treatment, silver soldering, and available sizes are discussed.

Diesel Engine Cooling Systems

No. 6384—Closed cooling systems for diesel engines, designed to reduce breakdowns and insurance rates, to eliminate scale, and to provide higher engine efficiency because of controlled soft water temperatures, are covered in bulletin No. 351 recently issued by Binks Mfg. Co., 3114-40 Carroll Ave., Chicago 12, Ill.

Double Pass Firebox Boilers

No. 6385—A new bulletin, No. RM-1, illustrates and describes the line of riveted or welded double pass, steel firebox boilers made by The Brownell Co., 408 N. Findlay St., Dayton 1, Ohio. These boilers are built for stoker, oil, or gas firing and range in capacity from 26 to 305 hp. They are made in three series: RM-A with all 3 in. fire tubes, RM-B with 4 in. direct tubes and 3 in. return tubes, and RM-C with all 4 in. tubes. The company offers its own ram or worm type stokers for RM boilers.

Draft Producing and Dust Collecting Equipment

No. 6386—The Prat-Daniel Corp., manufacturers of "Thermix" products, has released a new 20-page catalog (No. 200) on draft producing and dust collecting equipment. Detailed descriptions of fan-stacks and fans are illustrated, and supplementing the dust collector material is information on the company's new duplex collector designed for more efficient collection than is provided by the straight tubular design. Also featured is information on the "Aerotec" tube including photo-micrographs showing the tube performance on fly ash at high temperatures. Catalogs are available through the Thermix Engineering Co., Greenwich, Conn., project and sales engineers for the manufacturer.

Drying Equipment

No. 6387—Pittsburgh Lectrodryer Corp., P. O. Box 1766, Pittsburgh 30, Pa., has released a new 36-page bulletin (No. 105) illustrating and describing the company's drying equipment which includes breathers for storage tanks and filters for removing oil vapor from compressed air or gases. The catalog describes the use of drying equipment in the industrial field, metallurgy, pharmaceutical industry, oil and gas industry, and in the laboratory.

Electric Control Devices

No. 6388—Ward Leonard Electric Co., Mount Vernon, N. Y., has issued an 8-page bulletin, No. 100,000, on the company's line of electric control devices. The bulletin contains descriptive information and illustrations of the following electric control devices: a-c and d-c motor starters, speed and voltage regulators, resistors, ring and plate rheostats, switches, magnetic contactors, relays and dimmers.

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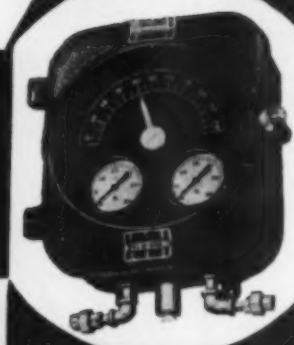

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The brass seating in these and all Jefferson Specialty Unions is an exclusive feature which, located in a recess away from the runway of the fitting, leaves a straight bore assuring unrestricted flow in the pipe.

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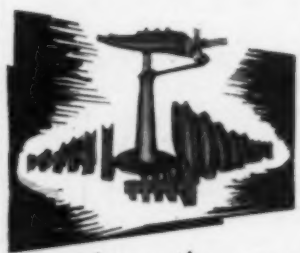
RADIANT HEAT PIPE BENDING is EASY, FAST with "American" MACHINES



Hand powered, the A-30 bends ⅜ to 2" standard pipe sizes at a radius of 5 to 1, up to 180°. Special radii can be supplied within these sizes.

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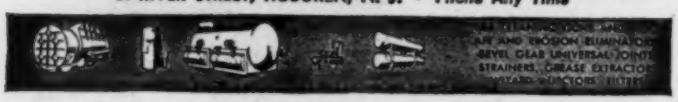

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Exhaust Fans

No. 6389—Catalog No. X5559 contains 16 pages covering propeller type exhaust fans offered by Emerson Electric Mfg. Co. St. Louis, Mo. Information on various types of installations and the selection of fan sizes is included together with data on fan design, construction, and performance. Both direct drive and belt drive fans and accessories for commercial and industrial use are covered.

Flexible Tubing

No. 6390—Compensators, as defined by the Chicago Metal Hose Corp., Maywood, Ill., are essentially flexible tube members designed to compensate for or absorb motion in general pipe line installations. They are designed to allow for motion in multiple planes as well as axial motion, and are described and illustrated in bulletin No. COM-1 which also includes diagrams of typical installations and gives data on working pressures and standard end fittings.

"Freon" Oil Separators

No. 6391—Acme Industries, Inc., Jackson, Mich., has released a new catalog (No. 636) on "Freon" oil separators for installations from ¼ to 10 hp. The units consist of seamless steel tubing for the shell, multiple screen cartridges, a steel baffle, and an oil return float valve assembly.

Glass Lined Tanks

No. 6392—The story of "Permaglas" is briefly told in bulletin No. 578, issued by A. O. Smith Corp., Milwaukee 1, Wis. The term is used to designate the company's glass lining for steel tanks and water heaters, and according to the manufacturer, the glass is fused into the steel and will bend within the elastic limit of the steel. In addition to glass-lined tanks, used extensively in the food and beverage industries, and the company's water heaters, the bulletin illustrates automobile frames, tubular goods such as welded line pipe and oil well casing, and welded steel vessels for high pressure and high temperature applications.

Heating, Air Conditioning, Air Handling Equipment

No. 6393—The second edition of What We Make (Catalog No. 500) has been published by the B. F. Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston 36, Mass. This 211-page condensed catalog gives essential engineering data and application information on over 50 different types of equipment for heating, ventilating, air conditioning, industrial drying, dust and fume control, mechanical draft, and pneumatic conveying. Some 74 pages of fundamental engineering data on air handling are included.

Hydraulic Oils for Industrial Equipment

No. 6394—The Vol. 32, No. 8 issue of Lubrication, the house organ of The Texas Co., 135 E. 42nd St., New York 17, N. Y., features an article on hydraulic oils for industrial equipment. After briefly reviewing the advantages, features and types of various hydraulic systems commonly used for power transmission, the desirable properties of these oils with respect to gum or sludge forming (as the result of oxidation), rust, contamination, and foaming are discussed.

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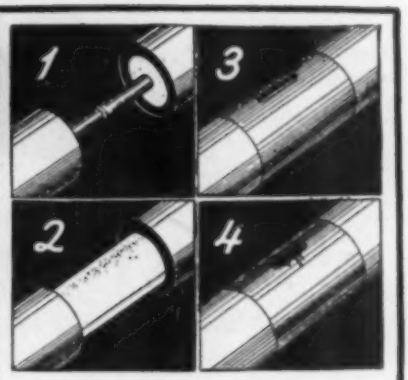

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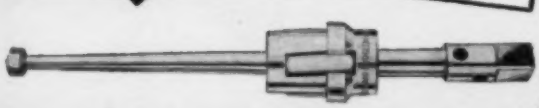

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No. 6395—"AlSiMag" is the trade name of a large family of technical ceramic materials which are used as insulators for electronic and electrical applications, as gas burner tips, flame nozzle tips, oil burner ignition insulators, and for many industrial applications such as thread guides and extrusion heads in certain fiber and chemical processes. The physical, chemical, electrical, and mechanical properties of the more frequently used compositions are given in a new chart released by the manufacturer, American Lava Corp., Chattanooga, Tenn.

Liquid Level and Pressure Controls

No. 6396—The Automatic Control Co., 1005 University Ave., St. Paul, Minn., manufacturer of liquid level and pressure controls for water, sewage, and industrial use, has issued a new consolidated price list (Bulletin CP-1). The company has also effected some changes in its discount schedule and suggests that purchasers contact local company representatives.

Magnesia Insulation

No. 6397—A description of the insulation survey service offered by distributors and approved contractors in the 85 per cent magnesia insulation industry is featured in the Vol. 2, 1946 Fall issue of the house organ published by the Magnesia Insulation Manufacturers Association, 1317 "F" St., N. W., Washington, D. C. Typical installations of insulating blocks and pipe and boiler covering are also described and illustrated.

Mechanical Packings

No. 6398—Greene, Tweed & Co., North Wales, Pa., has released a new 20-page catalog (No. PC-100) on its "Palmetto" line of mechanical packings which include self-lubricated, molded, sheet, and other special purpose types. Information on service applications, construction and performance features, and the process by which self-lubricating packings are made is included.

Metal Packings

No. 6399—An illustrated folder, describing various types of metal packings has been issued by the France Packing Co., 6512 State Rd., Philadelphia 35, Pa.

Metal Repair Cements

No. 6400—Practical, short cut methods for stopping leaks, sealing cracks, tightening loose parts and fixtures, etc. in heating and plumbing systems are but a few of the many applications for repair cements described in a new 40-page handbook issued by Smooth-On Mfg. Co., Dept. HPA, 570 Communipaw Ave., Jersey City 4, N.J. In addition to describing the various applications of metal cements, other special products such as for sealing cracks in masonry and concrete are covered.

Monel and Nickel Tubing

No. 6401—Double-walled, "Bundyweld" tubing of monel and nickel is made in standard sizes from 3/16 to 5/8 in. O D in lengths up to 100 ft by the Bundy Tubing Co. 10951 Hern Ave., Detroit 13, Mich. The tubing has been used extensively in the aircraft, beverage, food,

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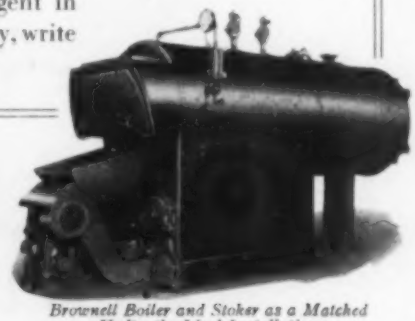

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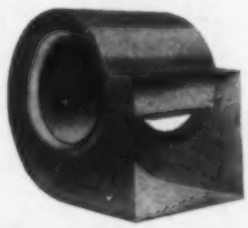

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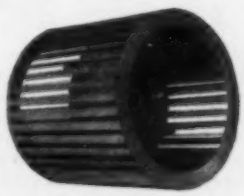

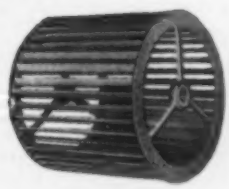

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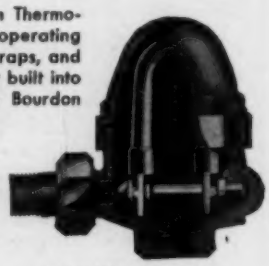

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chemical, and refrigeration industries and is now available for other industrial applications. The method of fabrication, applications, and properties of this tubing, both in nickel and monel, are described in the Vol. 20 No. 4 issue of the house organ published by the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Packaged Power Unit

No. 6402—"Electrofluid" drive denotes a packaged unit consisting of a general purpose induction motor flange-mounted to a housing and a hydraulic coupling. It is fully described and illustrated in a new 15-page booklet (No. 2085) released by Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.

Porcelain Lining for Preventing Corrosion

No. 6403—A porcelain lining, applied to the inside of either hot or cold water tanks to prevent corrosion, is described in a 16-page folder released by the Elastic Porcelain Lining Corp., 42 East Ave., Rochester 4, N. Y. Applied in the form of a plastic mortar, the lining is used in tanks for sprinkler storage, water softening, condensate, filtering, and many types of acid tanks. It is also said to reduce the formation of lime scale on coils.

Pouring Babbitt Bearings

No. 6404—A two-color, illustrated wall chart on how to pour bearings has been issued by Joseph T. Ryerson and Son, Inc., 16th and Rockwell Sts., Chicago, steel distributors and manufacturer of "Glyco" babbitt metals. A series of six cartoons illustrates the steps recommended for securing good, tightly lined bearings.

Power Squaring Shears

No. 6405—A new line of all steel power squaring shears designed for all types of shearing and trimming is described in a four-page bulletin issued by Parker Mfg. Co., 2200 Colorado Ave., Santa Monica, Calif. The shears will handle up to 14 gage sheets and the cutting length is 73 in. According to the manufacturer, drawn or folded parts may be cut within 1½ in. of the shoulder.

Protective Coatings

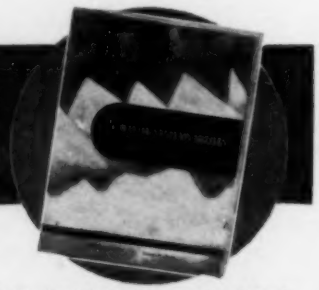
No. 6406—"Bitumastic" and "Bituplastic" protection coatings are basically coal-tar products manufactured by Wailes Dove-Hermiston Corp., Westfield, N. J., a subsidiary of the Koppers Co., Inc., A new visual index chart showing numerous industrial applications for these coatings is now available from the manufacturer.

Protective Goggles

No. 6407—"Specti-Goggles" for use in industrial grinding, chipping, welding, and similar hazardous operations are featured in catalog section No. AWP-50 released by the Eastern Equipment Co., Willow Grove, Pa. Eight basic spectacle type goggle designs and some 500 odd lens, sideshield, and frame combinations are offered. The catalog contains a price list.

Snap Action Temperature Controls

No. 6408—Spencer Thermostat Co., Attleboro, Mass., has announced a new catalog covering its "Klixon Thermo-Snap" temperature controls. The catalog describes the



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CATALOG NO. 22

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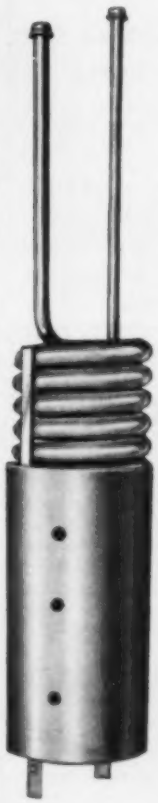

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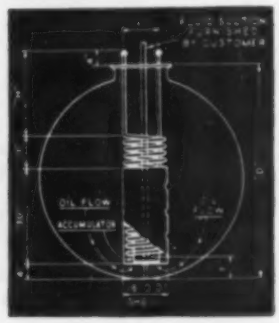

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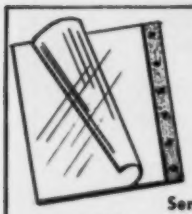

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various types of automatic and manual reset thermostats and gives dimensions, specifications, ampere ratings, and other data.

Spot Welding Air Conditioning Equipment

No. 6409—Spot welding various pieces of air conditioning equipment such as unit ventilators, heating and cooling surfaces, unit heaters, convectors, and other equipment at the plant of John J. Nesbitt, Inc., is briefly described and illustrated in the November 1946 issue of Weld-It, published by the Taylor-Winfield Corp., Warren, Ohio, manufacturer of resistance welding equipment.

Steam and Liquid Metering and Control

No. 6410—Brief articles on how to install draft gages, maintaining liquid meter accuracy, the use of CO_2 recorders in the steel and process industries, and preventing smoke with combustion instruments and automatic control are contained in the September-October issue of Metering Messages published by the J. W. Murphy Co., 236 N. Clark St., Chicago 1, Ill., distributors of metering and control equipment. Also discussed in this issue are a new pistol grip cleaner for small tubular apparatus and two-liquid level control applications in food processing.

Steam and Vapor Heating Specialties

No. 6411—Bulletin No. 114, issued by the Gorton Heating Corp., Cranford, N. J., describes the company's system of vaporizing and equalizing steam heating systems for automatic heating. Radiator equalizing valves and air eliminators for mains are featured. Recommended applications for each specialty with respect to the various parts of steam and vapor heating systems are included in the bulletin.

Steam Condensers

No. 6412—Steam surface condensers in a wide variety of types including the "standard" type where water flows through the tubes, the cylindrical shell type, marine type, vertical type, and the "water works" type, where the cooling water flows around the outside of the tubes, are described and illustrated in catalog No. 1461 issued by C. H. Wheeler Mfg. Co., Philadelphia 32, Pa. Jet condensers in both the low level and barometric types are also illustrated and briefly described.

Steam Generators

No. 6413—Design, construction, and operation features of sectional header boilers (5000 to 450,000 lb steam per hr capacity at pressures up to 900 psi) and bent tube steam generators (capacities from 20,000 lb per hr and up) are covered in a new 12-page bulletin offered by the Springfield Boiler Co., 1965 E. Capitol Ave., Springfield, Ill. Also included is detailed information on the company's new line of standardized, Type M, boilers for capacities of 6000 to 17,000 lb steam per hr from and at 212 F.

Steel Pipe Applications

No. 6414—Pipe in American Life, a 48-page illustrated booklet published by the committee on steel pipe research for the American Iron and Steel Institute, 350

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Bulletin 744

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402-08 Colvin St. Baltimore 2, Md.

Fifth Ave., New York 1, presents the historical background and modern uses of metal pipe, with emphasis on the use of steel pipe. Chapters are devoted to the uses of steel pipe in homes, large buildings, process industries, railroads, shipping, mining, water supply systems, irrigation on farms, and the oil, gas, and refrigeration industries. Much of the material, says the institute, has not been previously available as general information.

Temperature Controls

No. 6415—Individual booklets for separate use or for indexing in a loose leaf binder constitute the new catalog covering the control equipment manufactured by White-Rodgers Electric Co., 1209 Cass Ave., St. Louis 6, Mo. Design and construction features, specifications, dimensions, applications, instructions for installing and adjusting, and price lists are featured. The company's products include space thermostats, fan and limit controls, oil burner, stoker, and oven controls, relays, damper motors, gas valves and safety pilots, and controls for hot water, steam and refrigeration systems.

Thermal Properties of Transparent Plastic

No. 6416—A bulletin on the thermal properties of "Plexiglas" has been issued by Rohm & Hass Co. Washington Square, Philadelphia 5, Pa. In addition to data on the coefficient of thermal expansion, coefficient of thermal conductivity, and the specific heat, an alignment chart is included. This chart is designed to determine the overall coefficient of heat transfer through panels of this material (air to air, surface to air, or surface to surface coefficient) for various panel thicknesses and surface air velocities.

Thermocouples

No. 6417—"Alnor" thermocouples, protection tubes, wire, and accessories are described in a 36-page bulletin (No. 4181) issued by Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill. In addition to data on thermocouple resistance, insulation, and prices, the booklet contains recommendations for the protection of tubes, data on dimensions and applications of thermocouple assemblies, and briefly covers the company's pyrometers.

Two Stage, Opposed Impeller Centrifugal Pumps

No. 6418—Type DMD two stage, centrifugal pumps having opposed impellers and ball bearings are covered in bulletin No. C746 released by Economy Pumps, Inc., Hamilton, Ohio. These pumps, which use a short, stubby shaft, are made in capacities from 75 to 700 gpm for heads from 175 to 400 ft at 1750 rpm. They are said to be suitable for clear water services where pressures of 100 to 175 lb are required.

Water Chillers

No. 6419—"Dry-Ex" water chillers, Model DXG, are manufactured by Acme Industries, Inc., Jackson, Mich., and are described and illustrated in the company's catalog No. 631 which also includes dimensions and performance data together with instructions for selecting chiller sizes. Capacities of these shell and tube chillers range from 5.4 to 166 tons.

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Junior Mechanical Engineer—recent graduate with principal electives in Heating, Ventilating and Air Conditioning. Will be trained to become Asst. to head of dept. of old established Chicago Manufacturer. Ability in typing and shorthand valuable but not required. Salary open. ○○○○○○ We also have positions for seniors and juniors with our field representatives in many trading areas. Address Key No. 626-A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

Wanted: Air Conditioning & Refrigeration engineer in Midwest city capable of handling complete air conditioning engineering for retail and wholesale territory. Reply to key No. 624-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

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We have an opportunity in our established offices located in Cleveland, Chicago, and Oakland, California, for a capable designing engineer, experienced in the layout and design of industrial refrigeration systems.

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We have a position open for a capable Mechanical Engineer, in several of our established offices.

Applicants must possess a sound knowledge of Air Conditioning and Ventilation Systems for industrial projects, and be qualified to lay out, design, and prepare engineering drawings.

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16112 Euclid Avenue Cleveland 12, Ohio

Wanted: Engineer to act as chief of research development and application design of light duty domestic air conditioning, oil burner and evaporative cooling blowers. Capable of consulting with manufacturing customers of heating and/or cooling equipment as well as guiding basic research of air handling equipment. State in letter of application complete historical record of training and experience. Address Key No. 623-A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

HEATING, VENTILATING AND AIR CONDITIONING ENGINEER

Large oil company in Philadelphia area has vacancy for mechanical engineer to make engineering studies and computations, check plans, and prepare equipment specifications concerning heating, ventilating, air conditioning, and hydraulic problems in connection with alteration or construction of pipe line or marine terminals, miscellaneous industrial buildings, and service stations.

Requirements—B.S. degree in Mechanical Engineering, 30 to 50 years of age, and minimum of eight years' experience in responsible design position on heating, ventilating and air conditioning.

Apply by letter stating complete details of personal data, education, experience, availability, and salary desired. Address Key No. 629-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

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Suite 410 Bond Bldg. Washington 5, D. C.

SITUATIONS OPEN

Mechanical engineer with experience in design of residential heating equipment wanted by large manufacturer. Testing experience with radiators and oil or coal fired boilers desirable. Location New York vicinity. Address Key No. 602-A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

Senior application engineer, with Heating, Ventilating, Air Conditioning and Air Distribution experience. To become Asst. to dept. head of 50 year old Chicago Manufacturer of excellent standing. Will have opportunity to become dept. head. Should have engineering degree plus 6 - 10 years overall experience in all application phases, or, 3 years mech. engineer with electives in Heating, Ventilating and Air Conditioning and 10 years experience. Man must have contact ability as much of his effort will be in offices of leading consulting engineers throughout country. Salary open. Address key No. 627-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

AGENCIES

Graduate Mechanical Engineer with five years experience is opening new aggressive manufacturer's Representative Agency in Central New York and desires additional lines in the heating and air conditioning field to round out program. Address Key No. 621-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

Agents wanted throughout the United States and Foreign Countries to sell a nationally advertised line of condensing units. State territory desired and other lines handled or present connections. Our present employees and agents know of this advertisement. Answers will be held in utmost confidence. Address Key 622-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

MFG'S AGENTS wanted to handle Gas Conversion Burners and gun-type conversion oil burners. Reply stating which states you cover to Midland Heating Specialties Co., 19254 John R., Detroit 3, Mich.

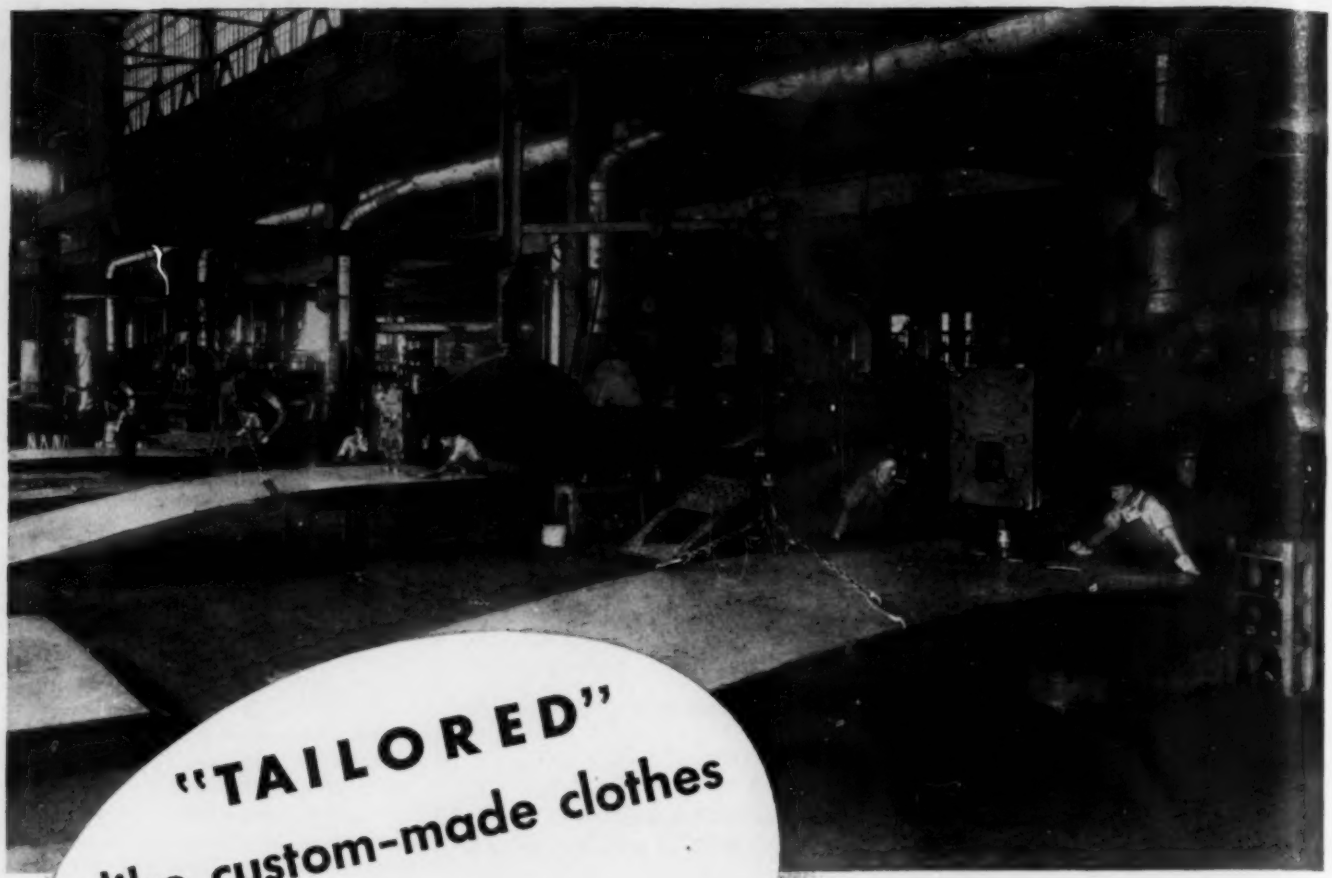
Young aggressive organization, traveling five men, covering the Southeastern territory solicits additional lines. References furnished. The Jeff A. Hedden Co., 3184 Roswell Road, NW, Atlanta, Ga.

SITUATION WANTED

Air Conditioning and Heating Engineer. Age 38. Fourteen years' experience in designing, estimating, drafting and supervisory work. Member ASHVE. Address E. A. Dillender, 1502 McCullough, Apt. No. 3, San Antonio 2, Texas.

WANTED

Interested in purchasing small plant for manufacturing gas heaters and stoves. Will consider manufacturing equipment only without building. Address Key 620-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.



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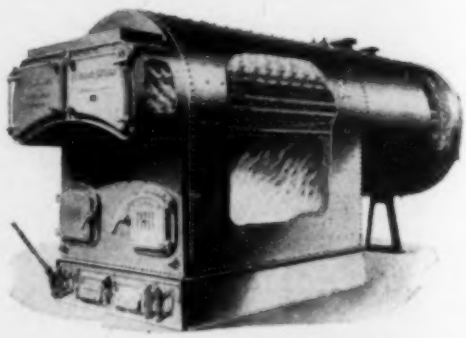

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1947 DIRECTORY

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for

INDUSTRIAL, COMMERCIAL, INSTITUTIONAL AND PUBLIC BUILDINGS

PART 1 – PRODUCTS CLASSIFIED – Page 242

If you want to know the names of one or more manufacturers making a certain product, look in Part 1, where products are classified alphabetically in "directory style" with the noun governing (for instance, "unit heaters" are listed under "heaters, unit").

PART 2 – TRADE NAMES – Page 317

If you have the trade name of a product and want to know who manufactures it, look in Part 2, where trade names are alphabetically listed. Trade names the same as or identifiable from the company name are not listed. Manufacturers with such trade names can be easily identified under their product classification in Part 1.

PART 3 – MANUFACTURERS' ADDRESSES – Page 329

For the complete name and address of any manufacturer look in Part 3.

● **The manufacturers whose names are spotted throughout the listings advertise in this issue. See Index to Advertisers (on page 343) for the page on which you will find the advertising of any of these manufacturers.**

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

DIRECTORY SECTION

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 1—PRODUCTS CLASSIFIED

ABSORBERS, VIBRATION

See Hose, Metal and Fittings; Bases and Pads, Vibration Isolating

ABSORBERS, VIBRATION, FOR REFRIGERANT LINES

American Metal Hose Branch, American Brass Co., Waterbury, Conn.
Atlantic Metal Hose Co., Inc., New York, N. Y.
Bendix Aviation Corp., Eclipse—Pioneer Div., Metal Hose Dept., Teterboro, N. J.
Chicago Metal Hose Corp., Maywood, Ill.
Packless Metal Products Corp., New Rochelle, N. Y.
Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Robinson Aviation, Inc., Vibrashock Div., Teterboro, N. J.
Seamlex Co., Inc., Long Island City, N. Y.
Titeflex, Inc., Newark, N. J.
United Metal Hose Co., Inc., Long Island City, N. Y.
● Zallea Brothers & Johnson, Wilmington, Del.

ABSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

ABSORPTION REFRIGERATION MACHINES

See Machines, Refrigeration, Absorption

ACCUMULATORS, REFRIGERATION (FOR AIR CONDITIONING)

● Acme Industries, Inc., Jackson, Mich.
Doyle & Roth Mfg. Co., Newark, N. J.
Frick Co., Waynesboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
McQuay, Inc., Minneapolis, Minn.
Phillips & Co., H. A., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Temprite Products Corp., Detroit, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
XL Refrigerating Co., Chicago, Ill.

ADHESIVES, FOR PIPE COVERING

Arabol Mfg. Co., New York, N. Y.
Flintkote Co., The, New York, N. Y.
Miracle Adhesives Corp., Newark, N. J.

ADJUSTABLE WRENCHES

See Wrenches, Adjustable

ADSORBERS, ODOR

Betz Corp., Hammond, Ind.
Carbide and Carbon Chemicals Corp., New York, N. Y.
Connor Engineering Corp., W. B., New York, N. Y.
Refinite Corp., Omaha, Neb.
Tamms Silica Co., Chicago, Ill.

ADSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

AFTERCOOLERS, COMPRESSED AIR

Adams Co., Inc., R. P., Buffalo, N. Y.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Locomotive Co., Alco Products Div., New York, N. Y.
Andale Co., Philadelphia, Pa.
● Bethlehem Steel Co., Bethlehem, Pa.
Blackburn-Smith Mfg. Co., River St., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Goodyer Industries, Inc., Chicago, Ill.
Griscom-Russell Co., The, New York, N. Y.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Ingersoll-Rand Co., New York, N. Y.
● Johnson Corp., Three Rivers, Mich.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind.
Modine Mfg. Co., Racine, Wis.
● Murray Mfg. Co., D. J., Wausau, Wis.
Parks-Cramer Co., Fitchburg, Mass.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Young Radiator Co., Racine, Wis.

AIR AFTERCOOLERS

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AIR BREAK FITTINGS

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AIR CLEANERS

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AIR COMPRESSORS

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AIR CONDITIONERS

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AIR CONDITIONING UNITS

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AIR DIFFUSERS

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AIR ELIMINATORS

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AIR FILTER CLEANING COMPOUNDS

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AIR FILTER GAGES

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AIR FRESHENING

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AIR VALVES

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AIR VELOCITY METERS

See Meters, Air Velocity, Direct Reading; Anemometers

AIR VOLUME METERS

See Meters, Volume, Air and Gas

AIR WASHERS

See Washers, Air

ALARMS, HIGH AND LOW BOILER WATER

American District Telegraph Co., New York, N. Y.
Bailey Co., Chas. M., San Francisco, Calif.
Combustion Control Corp., Cambridge, Mass.
Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
● Johnson Corp., Three Rivers, Mich.
Magnetrol, Inc., Chicago, Ill.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● McDonnell & Miller, Inc., Chicago, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Reliance Gauge Column Co., Cleveland, O.
Wright-Austin Co., Detroit, Mich.
● Yarnall-Waring Co., Philadelphia, Pa.

ALARMS, SMOKE

American District Telegraph Co., New York, N. Y.
● Autempeo Corp., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Davis Emergency Equipment Co., Newark, N. J.
Ess Specialty Corp., Bergenfield, N. J.
Instrument Engineering Associates, Brooklyn, N. Y.
Leeds & Northrup Co., Philadelphia, Pa.

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Photoswitch, Inc., Cambridge, Mass.
Power Engineering Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Worner Electronic Devices, Rankin, Il.

ALGAE CONTROL, WATER TREATMENT FOR SLIME AND

See Treatment, Water, for Slime and Algae Control

ALUMINUM COATED SHEETS

See Sheets, Aluminum Coated

ALUMINUM PIPE

See Pipe, Aluminum

ALUMINUM SHEETS

See Sheets, Aluminum

ANALYZERS, CARBON DIOXIDE, PORTABLE

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Davis Emergency Equipment Co., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co. F., W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Engelhard, Inc., Chas., Newark, N. J.
Hays Corp., Michigan City, Ind.
Hotstream Heater Co., Cleveland, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Service to Industry, West Hartford, Conn.
Uehling Instrument Co., Paterson, N. J.
Weaver Mfg. Co., Springfield, Ill.

ANEMOMETERS

American Instrument Co., Silver Spring, Md.
Barclay, Inc., Robert, Chicago, Ill.
Detroit Air Conditioning Service Co., Detroit, Mich.
Dietzgen Co., Eugene, Chicago, Ill.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Hill, E. Vernon, Chicago, Ill.
• Illinois Testing Laboratories, Inc., Chicago, Ill.
• Taylor Instrument Companies, Rochester, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Willson Products, Inc., Reading, Pa. (Thermometer type)

ANGLE VALVES

See Valves, Angle

ANGLES, BARS, BEAMS, CHANNELS AND TEES (LIGHT WEIGHT SHAPES)

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
• Aluminum Co. of America, Pittsburgh, Pa.
• American Brass Co., Waterbury, Conn.
Atlantic Steel Co., Atlanta, Ga.
• Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Carnegie-Illinois Steel Co., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Columbia Steel Co., San Francisco, Calif.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Decatur Iron & Steel Co., Decatur, Ala.
Dow Chemical Co., The, Midland, Mich.
Inland Steel Co., Chicago, Ill.
International Steel Co., Evansville, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
Lees, John, Div., Serrick Corp., Muncie, Ind.
Meaker & Co., Geo. L., Evansville, Ind.
Milcor Steel Co., Milwaukee, Wis.
Republic Steel Corp., Cleveland, O.
• Revere Copper and Brass, Incorporated, New York, N. Y.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
Truscon Steel Co., Youngstown, O.
• Weirton Steel Co., Weirton, W. Va.
• Youngstown Sheet & Tube Co., Youngstown, O.

AQUASTATS

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ARC WELDERS

See Welders, Arc

ARC WELDING ELECTRODES

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ASBESTOS FIBER AND CEMENT PIPE

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ASBESTOS PACKING

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ASH CONVEYORS

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ATOMIZING NOZZLES

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AXIAL FLOW FANS

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BALANCING ELBOWS FOR HOT WATER HEATING SYSTEMS

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BALANCING EQUIPMENT

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BALANCING VALVES

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BALL BEARINGS

See Bearings, Ball

BAROMETRIC CONTROLS

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BASEBOARD RADIATION

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BASES, MOTOR, TENSION ADJUSTING

Ackermann Mfg. Co., Wheeling, W. Va.
Alexander Bros., Philadelphia, Pa.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Browning Mfg. Co., Inc., Maysville, Ky.
Electrovent Fan & Mfg. Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Maysteel Products, Inc., Milwaukee, Wis.
Remco Products Corp., York, Pa.
Rhoads & Sons, J. E., Philadelphia, Pa.
Rockwood Mfg. Co., Indianapolis, Ind.

BASES AND PADS, VIBRATION ISOLATING

• Buffalo Forge Co., Buffalo, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Cork Import Corp., Englewood, N. J.
Cork Insulation Co., Inc., New York, N. Y.
Felters Company, The, Boston, Mass.
Firestone Tire & Rubber Co., Akron, O.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., Akron, O.
Johns-Manville, New York, N. Y.
Keldur Corp., New York, N. Y.
• Korfund Co., Inc., Long Island City, N. Y.
Lord Mfg. Co., Erie, Pa.
M B Mfg. Co., Inc., The, New Haven, Conn.
• Mundet Cork Corp., Brooklyn, N. Y.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Remco Products Corp., York, Pa.
Robinson Aviation, Inc., Vibrashock Div., Teterboro, N. J.
Sponge Rubber Products Co., Shelton, Conn.
United Cork Companies, Lyndhurst, N. J.
United States Rubber Co., New York, N. Y.
Vibration Eliminator Co., Long Island City, N. Y.
Viking Air Conditioning Corp., Cleveland, O.
Western Felt Works, Chicago, Ill.

BEARINGS, BALL

Ahlberg Bearing Co., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Halfco, Inc., Los Angeles, Calif.
Link-Belt Co., Indianapolis, Ind.
Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., The, Fairview, Poughkeepsie, N. Y.
• Stephens-Adamson Mfg. Co., Aurora, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, NEEDLE

Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Roller Bearings Co. of America, Trenton, N. J.

BEARINGS, PILLOW BLOCK

Ahlberg Bearing Co., Chicago, Ill.
Anti-Friction Bearings Co., Los Angeles, Calif.
Caldwell Co., W. E., Louisville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Dick Co., Inc., R. & J., Passaic, Ind.

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Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Freed Products Co., Moline, Ill.
Goldens' Foundry & Machine Co., Columbus, Ga.
Halfco, Inc., Los Angeles, Calif.
Hastings Air Conditioning Co., Hastings, Neb.
Jeffrey Mfg. Co., Columbus, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
• Lau Blower Co., Dayton, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp. Dayton, O.
Norma-Hoffman Bearings Corp., Stamford, Conn.
• Randall Graphite Products Corp., Chicago, Ill.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Chicago, Ill. (self ailgning)
Sprout, Waldron & Co., Muncy, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
• Stephens-Adamson Mfg. Co., Aurora, Ill.
Triangle Mfg. Co., Oshkosh, Wis.
Viking Air Conditioning Corp., Cleveland, O.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, ROLLER

Ahlberg Bearing Co., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Chicago, Ill. (self aligning)
Thomson Industries, Inc., Long Island City, N. Y.
Timken Roller Bearing Co., Canton, O.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, SLEEVE

Dodge Mfg. Co., Mishawaka, Ind.
Federal-Mogul Corp., Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Keystone Carbon Co., Inc., St. Marys, Pa.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp., Dayton, O.
Motex Metal Process Corp., Detroit, Mich.
• Randall Graphite Products Corp., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BELLOWS, THERMOSTATIC AND METALLIC

• Bishop & Babcock Mfg. Co., Cleveland, O.
Bridgeport Thermostat Co., Inc., Bridgeport, Conn.
Cashin Co., W. D. Boston, Mass.
Chicago Metal Hose Corp., Maywood, Ill.
Clifford Mfg. Co., Boston, Mass.
Cook Electric Co., Chicago, Ill.
• Fulton Sylphon Co., Knoxville, Tenn.
Giannini Co., Inc., G. M., Pasadena, Calif.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
Sterling, Inc., Milwaukee, Wis.

BELTING, FLAT, LEATHER

Alexander Bros., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Chicago Belting Co., Chicago, Ill.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Williams & Son, I. B., Dover, N. H.

BELTING, FLAT, RUBBER

Boston Woven Hose & Rubber Co., Boston, Mass.
Continental Rubber Wks., Erie, Pa.
Dick Co., Inc., R. & J., Passaic, N. J.
Firestone Tire & Rubber Co., Akron, O.
Garlock Packing Co., Palmyra, N. Y.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hamilton Rubber Mfg. Co., Trenton, N. J.
Jeffrey Mfg. Co., Columbus, O.
Manheim Mfg. & Belting Co., Manheim, Pa.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.

BELTS, V

• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Dayton Rubber Mfg. Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.
Dodge Mfg. Corp., Mishawaka, Ind.
Firestone Tire & Rubber Co., Akron, O.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Manheim Mfg. & Belting Co., Manheim, Pa.
Medart Co., St. Louis, Mo.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Rockwood Mfg. Co., Indianapolis, Ind.
Schieren Co., Chas. A., New York, N. Y.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

BENDERS, PIPE

• American Pipe Bending Machine Co., Inc., Poultney, Vt.
American Pipe Tool Co., Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
• Buffalo Forge Co., Buffalo, N. Y.
Crown Die & Tool Co., Chicago, Ill. (Hand)
Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pines Engineering Co., Inc., Aurora, Ill.
Sac Tool Mfg. Co., St. Louis, Mo.
Shaw-Kendall Engineering Co., Toledo, O.
Tal Prestal Bender, Inc., Milwaukee, Wis.
Vanderman Mfg. Co., Willimantic, Conn.
Wallace Supplies Mfg. Co., Chicago, Ill.
• Watson-Stillman Co., Roselle, N. J.

BENDERS, TUBING

• American Pipe Bending Machine Co., Inc., Poultney, Vt.
Armstrong Mfg. Co., Bridgeport, Conn.
Bernz Co., Inc., Otto, Rochester, N. Y.
• Buffalo Forge Co., Buffalo, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Everhot Products Co., Chicago, Ill.
Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Griffith Equipment Co., Inc., Los Angeles, Calif.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
Imperial Brass Mfg. Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
Leonard Precision Products Co., Garden Grove, Calif.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Parker Appliance Co., The, Cleveland, O.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Perfection Refrigeration Parts Co., Harvey, Ill.
Pines Engineering Co., Inc., Aurora, Ill.
Sac Tool Mfg. Co., St. Louis, Mo.
Steel City Electric Co., Pittsburgh, Pa.
Wallace Supplies Mfg. Co., Chicago, Ill.
• Watson-Stillman Co., Roselle, N. J.

BENDS, EXPANSION, STEAM PIPE

American Locomotive Co., Alco Products Div., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
• Crane Co., Chicago, Ill.
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Flori Pipe Co., The, St. Louis, Mo.
• Grinnell Co., Inc., Providence, R. I.
Harris & Co., Arthur, Chicago, Ill. (Stainless & non-ferrous)
Harrisburg Steel Corp., Harrisburg, Pa.
Kellogg Co., M. W., The, New York, N. Y. (Corrugated steel)
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
• Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Ohio Pipe Bending & Machine Co., Cleveland, O.
Oiljack Mfg. Co., Inc., Montclair, N. J.
Parks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
• Rempe Co., Chicago, Ill.
• Ric-wiL Co., Cleveland, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw-Kendall Engineering Co., Toledo, O.
Swan Engineering Co., Inc., Bloomfield, N. J.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
• Walworth Co., New York, N. Y.
Western Piping & Engineering Co., San Francisco, Calif.
• Whitlock Mfg. Co., Hartford, Conn.

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National Radiator Co., The, Johnstown, Pa.

• Crane Co., Chicago, Ill.

BI-METALS, THERMOSTATIC

Chase Co., W. M., Detroit, Mich.
General Plate Div., Metals & Controls Corp. Attleboro, Mass.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Wilson Co., H. A., The, Newark, N. J.

BLADES, PROPELLER FAN

Ackermann Mfg. Co., Wheeling, W. Va.
Aerovent Fan Co., Piqua, O.
Aire-Foile Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
• Alliance Mfg. Co., Alliance, O.
• Burden Fan & Blower Co., Los Angeles, Calif.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Champion Blower & Forge Co., Lancaster, Pa.
• Chelsea Products, Inc., Irvington, N. J.
Circulators & Devices Mfg. Corp., New York, N. Y.
Dallas Engineering Co., Inc., Dallas, Tex.
DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dual Air Fan Co., Chicago, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Gates Engineering Co., Wilmington, Del.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
International Engrg., Inc., Dayton, O.
Jeffrey Mfg. Co., Columbus, O.
La-Del Div.—Joy Mfg. Co., New Philadelphia, O.
Martin Fan & Blower Co., Chicago, Ill.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Motionair Co., Beverly Hills, Calif.
Myers Electric Co., Inc., Pittsburgh, Pa.
Nationalaire Corp., Detroit, Mich.
Norwin Co., Freeport, Ill.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Peerless Electric Co., Warren, O.
Propellair, Inc., Springfield, O.
Schwitzer-Cummins Co., Indianapolis, Ind.
• South Bend Air Products, Inc., South Bend, Ind.
Thermal Industries, Indio, Calif.
Torrington Mfg. Co., Torrington, Conn.
Utility Appliance Corp., Los Angeles, Calif.
Victor Electric Products, Inc., Cincinnati, O.

BLAST GATES

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BLAST HEATERS

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BLAST HEATING COILS

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BLOWER FANS

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BLOWER HOUSINGS

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BLOWER WHEELS

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BLOWERS, HIGH PRESSURE

For Low Pressure Blower Fans, See Fans, Centrifugal

Aladdin Heating Corp., Oakland, Calif.
Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Blower Corp., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis
Beach-Russ Co., New York, N. Y.
• Buffalo Forge Co., Buffalo, N. Y.
Buffalo Turbine Corp., Buffalo, N. Y.
Caldwell Co., Wm. J., Washington, D. C.
Carling Turbine Blower Co., Worcester, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
• Chelsea Products, Inc., Irvington, N. J.
• Clarage Fan Co., Kalamazoo, Mich.
De Laval Steam Turbine Co., Trenton, N. J.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eclipse Fuel Engineering Co., Rockford, Ill.
• General Blower Co., Morton Grove, Ill.
Ingersoll-Rand Co., New York, N. Y.
L-R Mfg. Co., Blower Div., Torrington, Conn.
La-Del Div.—Joy Mfg. Co., New Philadelphia, O.
Lammert & Mann Co., Chicago, Ill.
Martin Fan & Blower Co., Chicago, Ill.
Muncie Gear Wks., Muncie, Ind.
• Mid-Continent Metal Products Co., National Gas Burner Div., Chicago, Ill.
National Machine Works, Chicago, Ill.
North American Mfg. Co., Cleveland, O.
Power Engineering Co., Chicago, Ill.
Prat-Daniel Corp., Port Chester, N. Y.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Trimount Rotary Power Co., East Bedham, Mass.
• United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Western Blower Co., Seattle, Wash.
• Wing Mfg. Co., L. J., New York, N. Y.

BLOWERS, SOOT

Bayer Co., St. Louis, Mo.
Diamond Power Specialty Corp., Detroit, Mich.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Marion Machine Foundry & Supply Co., Marion, Ind.
Perfection Grate & Stoker Co., Springfield, Mass.

BLOW-OFF VALVES

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BLUE PRINT MACHINES

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BOILER FEEDERS

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BOILER OBSERVATION PORTS

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BOILER SEALING COMPOUNDS

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BOILER AND TANK INSULATION

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BOILER TUBES

See Tubes, Boiler

BOILER WATER ALARMS

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BOILERS, HEATING, CAST IRON, SECTIONAL

2000 Sq Ft Steam Radiation and Over

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Bastian-Morley Co., Inc., La Porte, Ind.
Bryant Steam Corp., Peru, Ind.
Bryant Heater Co., The, Cleveland, O.
• Burnham Boiler Corp., Irvington, N. Y.
Columbia Radiator Co., McKeesport, Pa.
• Crane Co., Chicago, Ill.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
Herbert Boiler Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kohler Co., Kohler, Wis.
Mueller Furnace Co., L. J., Milwaukee, Wis.
National Radiator Co., The, Johnstown, Pa.
Prox Co., Inc., Frank, Terre Haute, Ind.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
• Smith Co., Inc., H. B., The, Westfield, Mass.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
Surface Combustion Corp., Toledo, O.
Thatcher Furnace Co., Garwood, N. J.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

BOILERS, HEATING, STEEL, FIRE TUBE

2000 Sq Ft Steam Radiation and Over

Aldrich Co., The, Wyoming, Ill.
Atlantic Steel Boiler Co., Philadelphia, Pa.
Bigelow Co., New Haven, Conn.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
• Brownell Co., Dayton, O.
• Burnham Boiler Corp., Irvington, N. Y.
Combination Boiler Co., Benton Harbor, Mich.
Combustion Engineering Co., Inc., New York, N. Y.
Dillon Steam Boiler Wks., Inc., D. M. Fitchburg, Mass.
Erie City Iron Wks., Erie, Pa.
Farrar & Trefts, Buffalo, N. Y.
• Fitzgibbons Boiler Co., Inc., New York, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Gallaher Boiler Co., St. Louis, Mo.
Hamburg Boiler Works, Inc., Hamburg, Pa.
Hodge Boiler Wks., East Boston, Mass.
International Engineering Wks., Inc., Framingham, Mass.
Johnston Bros., Inc., Ferrysburg, Mich.
• Kewanee Boiler Corp., Kewanee, Ill.
Leffel & Co., James, Springfield, O.
Loline Steel Boiler Co., Allentown, Pa.
Lookout Boiler & Mfg. Co., Chattanooga, Tenn.
Manitowoc Boiler Wks., Manitowoc, Wis.
Murray Iron Wks. Co., Burlington, Ia.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

National Radiator Co., The, Johnstown, Pa.
Orr & Sembower, Inc., Reading, Pa.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Smith Twin Tubular Boiler Co., Inc., Philadelphia, Pa.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
Terre Haute Boiler Works Co., Terre Haute, Ind.
• Titusville Iron Wks. Co., Titusville, Pa.
Union Iron Wks., Erie, Pa.
Wickes Boiler Co., Saginaw, Mich.

BOILERS, HEATING, STEEL, WATER TUBE

Anetsberger Bros., Chicago, Ill.
Atlantic Steel Boiler Co., Philadelphia, Pa.
Babcock & Wilcox Co., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Combination Boiler Co., Benton Harbor, Mich.
Combustion Engineering Co., Inc., New York, N. Y.
Edge Moor Iron Wks., Inc., Edge Moor, Del.
Erie City Iron Wks., Erie, Pa.
Heat Equipment Co., Chicago, Ill.
International Boiler Wks. Co., East Stroudsburg, Pa.
International Engineering Wks., Inc., Framingham, Mass.
Keeler Co., E., Williamsport, Pa.
Murray Iron Wks., Co., Burlington, Ia.
Norman Products Co., Inc., Columbus, O.
Riley Stoker Corp., Worcester, Mass
Smith Twin Tubular Boiler Co., Inc., Philadelphia Pa.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
Springfield Boiler Co., Springfield, Ill.
Sullivan Valve & Engineering Co., Butte, Mont.
Super Mold Corp., Lodi, Calif.
• Titusville Iron Works Co., Titusville, Pa.
Union Iron Works, Erie, Pa.
Vapor Car Heating Co., Inc., Chicago, Ill.
Waterfilm Boilers, Inc., Jersey City, N. J.
Wickes Boiler Co., Saginaw, Mich.

BOILERS, STEAM GENERATING UNITS, HEATING AND PROCESS

Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Bigelow Co., New Haven, Conn.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Brown Fintube Co., The, Elyria, O.
Brownell Co., Dayton, O.
Bryan Steam Corp., Peru, Ind.
Clayton Mfg. Co., Alhambra, Calif.
Cleaver-Brooks Co., Milwaukee, Wis.
Cyclotherm Corp., New York, N. Y.
Eclipse Fuel Engineering Co. Rockford, Ill.
Erie City Iron Works, Erie, Pa.
• Fitzgibbons Boiler Co., Inc., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
General Furnaces Corp., Oswego, N. Y.
Hodge Boiler Works, East Boston, Mass.
Hynes Electric Heating Co., Camden, N. J.
International Boiler Works Co., East Stroudsburg, Pa.
International Engineering Works, Inc., Framingham, Mass.
Johnson Co., S. T., Oakland, Calif.
Johnston Bros., Inc., Ferrysburg, Mich.
Keeler Co., E., Williamsport, Pa.
Leffel & Co., James, Springfield, O.
Livingstone & Co., Boston, Mass.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Murray Iron Works Co., Burlington, Ia.
Orr & Sembower, Inc., Reading, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Sellers Engineering Co., Chicago, Ill.
Stout & Sons, David, St. Louis, Mo.
Thermal Engineering Co., Chicago, Ill.
• Titusville Iron Works Co., Titusville, Pa.
Union Iron Works, Erie, Pa.
Vapor Car Heating Co., Inc., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
Western Piping & Engineering Co., San Francisco, Calif.
Wickes Boiler Co., Saginaw, Mich.
York-Shipley, Inc., Industrial Div., York, Pa.

BOLTS, EXPANSION

Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Industrial Screw Co., Chicago, Ill.
National Lead Co., New York, N. Y.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Rolyan Metal Products, Chicago, Ill.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOLTS AND STUDS, FLANGE

• Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., North Tonawanda, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Bros. Bolt Co., Milldale, Conn.
• Crane Co., Chicago, Ill.
Erie Bolt & Nut Co., Erie, Pa.
Harper Co., H. M., Chicago, Ill.
Haskell Mfg. Co., Wm. H., Pawtucket, R. I.
Industrial Screw Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Pheoll Mfg. Co., Chicago, Ill.
Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Rockford Screw Products Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS, TOGGLE AND ANCHOR

Buffalo Bolt Co., North Tonawanda, N. Y.
Carpenter & Paterson, Inc., East Boston, Mass.
• Carty & Moore Engineering Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Manasquan, N. J.
Grabler Mfg. Co., Cleveland, O.
Industrial Screw Co., Chicago, Ill.
Moore Co., Goodloe E., Danville, Ill.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOOTHS, PAINTING, SPRAY

Binks Mfg. Co., Chicago, Ill.
Centri-Spray Corp., Detroit, Mich. (wet type)
Circulators & Devices Mfg. Corp., New York, N. Y.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mahon Co., R. C., Detroit, Mich.
Newcomb Engineering Co., Grand Rapids, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Young & Bertke Co., Cincinnati, O.

BRAKES, SHEET METAL, HAND

Dreis & Krump Mfg. Co., Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Excelsior Tool & Machine Co., East St. Louis, Ill.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Works, Buffalo, N. Y.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
St. Louis Tool Co., St. Louis, Mo.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, PORTABLE

Dries & Krump Mfg. Co., Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Harris, A. R., Hammond, Ind.
Niagara Machine & Tool Works, Buffalo, N. Y.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, POWER

Bath Co., Cyril, The, Cleveland, O.
Cincinnati Shaper Co., Cincinnati, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Heartley Machine & Tool Co., Toledo, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Ohl & Co., Geo. A., Newark, N. J.
Peck, Stow & Wilcox Co., Southington, Conn.
Rafter Machine Co., Inc., Belleville, N. J.
Verson Allsteel Press Co., Chicago, Ill.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.
Wilson Co., K. R., Buffalo, N. Y.

BRASS PIPE

See Pipe, Brass and Copper

BRASS TUBING

See Tubing, Brass and Copper

BRASS UNIONS

See Unions, Brass

BRASS VALVES

See Valves, Gate; and Valves, Globe

BRAZING TORCHES

See Torches, Brazing

BRONZE VALVES

See Valves, Gate; and Valves, Globe

BUILDING INSULATION

See Insulation, Building

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

BURNERS, GAS, COMMERCIAL AND INDUSTRIAL

Barber Gas Burner Co., Cleveland, O.
Barton Co., Minneapolis, Minn.
Beck Engineering Combustion Kompany, St. Louis, Mo.
Bryant Heater Co., The, Cleveland, O.
Campbell Heating Co., E. K., Kansas City, Mo.
Coppus Engineering Corp., Worcester, Mass.
Dalzen Tool & Mfg. Co., Detroit, Mich.
Eclipse Fuel Engrg. Co., Rockford, Ill.
Engineer Co., New York, N. Y.
• Enterprise Engine & Foundry Co., San Francisco, Calif.
Finn Engineers, Inc., Jerry, Heating Div., St. Paul, Minn.
Jamieson Mfg. Co., Dallas, Tex.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Martin, J. O. & C. U., San Francisco, Calif.
• Mettler Co., Lee B., Los Angeles, Calif.
• Mid-Continent Metal Products Co., National Gas Burner Div., Chicago, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Newcomb Engineering Co., Grand Rapids, Mich.
North American Mfg. Co., Cleveland, O.
Payne Furnace Co., Beverly Hills, Calif.
Peabody Engrg. Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Ray Oil Burner Co., San Francisco, Calif.
Reinhard Brothers Co., Minneapolis, Minn.
Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Rotary Mfg. Co., Los Angeles, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Selas Corp. of America, Philadelphia, Pa.
Sellers Engineering Co., Chicago, Ill.
Shaw Burner Co., Arkansas City, Kan.
Sonner Burner Co., Winfield, Kan.
Staples & Pfeiffer, San Francisco, Calif.
Standard Fuel & Engineering Co., Detroit, Mich.
Stout & Sons, David, St. Louis, Mo.
Sullivan Valve & Engineering Co., Butte, Mont.
Surface Combustion Corp., Toledo, O.
Todd Shipyards Corp., Combustion Equipment Div., New York, N. Y.
• Webster Engineering Co., Tulsa, Okla.
Williams, Inc., F. C., Dearborn, Mich.
• Zink Co., John, Tulsa, Okla.

BURNERS, GAS AND OIL COMBINED, COMMERCIAL AND INDUSTRIAL

Auburn Burner Co., Auburn, Ind.
Babcock & Wilcox Co., New York, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Eclipse Fuel Engineering Co., Rockford, Ill.
Engineer Co., New York, N. Y.
• Enterprise Engine & Foundry Co., San Francisco, Calif.
Johnson Co., S. T., Oakland, Calif.
Lammert & Mann Co., Chicago, Ill.
• Mettler Co., Lee B., Los Angeles, Calif.
National Airoil Burner Co., Inc., Philadelphia, Pa.
North American Mfg. Co., Cleveland, O.
Peabody Engineering Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Ray Oil Burner Co., San Francisco, Calif.
Sellers Engineering Co., Chicago, Ill.
Staples & Pfeiffer, San Francisco, Calif.
Surface Combustion Corp., Toledo, O.
Thermal Engineering Co., Chicago, Ill.
Todd Shipyards Corp., Combustion Equipment Div., New York, N. Y.
• Webster Engineering Co., Tulsa, Okla.
• Zink Co., John, Tulsa, Okla.

BURNERS, OIL, COMMERCIAL AND INDUSTRIAL

Ace Engineering Co., Chicago, Ill.
• Airtemp, Div. of Chrysler Corp., Dayton, O.
American Heat Corp., Lowell, Mass.
Babcock & Wilcox Co., New York, N. Y.
Bethlehem Foundry & Machine Co., Bethlehem, Pa.
Bettendorff Oil Burner Co., Marshalltown, Ia.
Caloroil Burner Corp., Hartford, Conn.
Century Engrg. Corp., Cedar Rapids, Ia.
Chandler Co., Cedar Rapids, Ia.
Chisholm Co., Allen E., Portland, Ore.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Dalmo-Victor Co., San Carlos, Calif.
Eastern Oil & Equipment Co., Inc., Portland, Me.
Eckhart Mfg. Co., Roselle Park, N. J.
Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
Engineering Co., New York, N. Y.
• Enterprise Engine & Foundry Co., San Francisco, Calif.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Hardinge Mfg. & Oil Burner Co., Chicago, Ill.
Harvey-Whipple, Inc., Springfield, Mass.
Holtum Mfg. Co., Freeport, Ill.
• Iron Fireman Mfg. Co., Cleveland, O.
Jackson & Church Co., Saginaw, Mich.
Johnson Co., S. T., Oakland, Calif.
Kleen-Heet, Inc., Chicago, Ill.
Lammert & Mann Co., Chicago, Ill.
Littleford Bros., Cincinnati, O.
Marine Mfg. Co., Chicago, Ill.
• Mettler Co., Lee B., Los Angeles, Calif.
Montag Stove & Furnace Works, Portland, Ore.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Oil Burner Corp., Brooklyn, N. Y.
North American Mfg. Co., Cleveland, O.
Nu-Way Corp., The, Rock Island, Ill.
Pan-American Engineering Co., Berkeley, Calif.
Peabody Engrg. Corp., New York, N. Y.
• Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Ray Oil Burner Co., San Francisco, Calif.
Rayfield Co., C. L., Chicago, Ill.
Reif-Rexoil, Inc., Buffalo, N. Y.
Reily Stoker Corp., Worcester, Mass.
Rotary Mfg. Co., Los Angeles, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Shaw Burner Co., Arkansas City, Kan.
Simplex Oil Heating Corp., New York, N. Y.
Staples & Pfeiffer, San Francisco, Calif.
Thermal Engineering Co., Chicago, Ill.
Todd Shipyards Corp., Combustion Equipment Div., New York, N. Y.
• Webster Engineering Co., Tulsa, Okla.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
York-Heat Div., York-Shipley, Inc., York, Pa.
York-Shipley, Inc., Industrial Div., York, Pa.
• Zink Co., John, Tulsa, Okla.

BURNERS, PULVERIZED COAL, COMMERCIAL AND INDUSTRIAL

Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering Co., Inc., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Whiting Corp., Harvey, Ill.

BURNERS, PULVERIZED COAL AND GAS, COMBINED, COMMERCIAL AND INDUSTRIAL

Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering Co., Inc., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

BURNERS, PULVERIZED COAL AND OIL, COMBINED, COMMERCIAL AND INDUSTRIAL

Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering Co., Inc., New York, N. Y.
Engineer Co., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

CARBON DIOXIDE ANALYZERS

See Analyzers, Carbon Dioxide, Portable

CARBON DIOXIDE INDICATORS

See Indicators, Carbon Dioxide, Boiler Room

CARBON PIPE, TUBING, FITTINGS AND VALVES

See Pipe, Tubing, Fittings and Valves, Carbon and Graphite

CAST IRON PIPE

See Pipe, Cast Iron

CEMENT AND COMPOUNDS, PIPE JOINT

Acme Refining Co., The, Cleveland, O.
Acorn Refining Co., Cleveland, O.
Akron Metallic Gasket Co., Akron, O.
Arco Co., Cleveland, O.
Atlas Chemical Co., Marietta, O.
Babbitt Chemical Specialties Co., New York, N. Y.
Baer Bros., New York, N. Y.
Black Magic Products Co., Tulsa, Okla.
Blue Ridge Talc Co., Inc., Henry, Va.
Blue Seal Chemical Co., Roselle Park, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cabot, Inc., Samuel, Boston, Mass.
Calbar Paint & Varnish Co., Philadelphia, Pa.
Chicago Specialty Mfg. Co., Chicago, Ill.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Continental Products Co., Euclid, O.
Cooper Sanitary Co., Philadelphia, Pa.
• Crane Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Croll & Son, Jesse G., Philadelphia, Pa.
Detroit Graphite Co., Detroit, Mich.
Diamond Chemical Products, New York, N. Y.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Greene, Tweed & Co., New York, N. Y.
• Grinnell Co., Inc., Providence, R. I.
Hercules Chemical Co., Inc., New York, N. Y.
Hetzel Roofing Products Co., Newark, N. J.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Horn Co., A. C., Long Island City, N. Y.
● Key Co., East St. Louis, Ill.
Keystone Asphalt Products Co., Chicago, Ill.
Krehbiel Co., J. H., Chicago, Ill.
Lake Chemical Co., Chicago, Ill.
Macksons Co., New York, N. Y.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Montgomery Bros., San Francisco, Calif.
National Engineering Products, Inc., Washington, D. C.
Nebel Mfg. Co., Cleveland, O.
Pecora Paint Co., Inc., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Permatex Co., Inc., Brooklyn, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Rockwood Sprinkler Co., Worcester, Mass.
● Rutland Fire Clay Co., Rutland, Vt.
Sauereisen Cements Co., Pittsburgh, Pa.
Saverite Engineering Co., Hoboken, N. J.
Schundler & Co., F. E., Long Island City, N. Y.
Smooth-On Mfg. Co., Jersey City, N. J.
Star Products Co., New York, N. Y.
Thompson & Co., Pittsburgh, Pa.
United States Stoneware Co., New York, N. Y.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wilhelm Co., A., Reading, Pa.
● X Laboratories, Inc., New York, N. Y.
X-Pando Corp., Long Island City, N. Y.

CEMENT, FURNACE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Armstrong Co., Detroit, Mich.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Fire Brick Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clinton Metallic Paint Co., Clinton, N. Y. (Asbestos)
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Continental Products Co., Euclid, O.
Diamond Chemical Products, New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
● Grant Wilson, Inc., Chicago, Ill. (Asbestos)
Green Fire Brick Co., A. P., Mexico, Mo.
Hercules Chemical Co., Inc., New York, N. Y.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y. (Asbestos)
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Lastik Products Co., Inc., Pittsburgh, Pa.
McLeod & Henry Co., Inc., Troy, N. Y.
Munn and Steele, Inc., Newark, N. J.
Nebel Mfg. Co., Cleveland, O.
Pecora Paint Co., Philadelphia, Pa.
Plastic Products Co., Detroit, Mich.
Preferred Utilities Mfg. Corp., New York, N. Y.
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Ruberoid Co., New York, N. Y.
● Rutland Fire Clay Co., Rutland, Vt.
Sall Mountain Co., Chicago, Ill.
Sauereisen Cements Co., Pittsburgh, Pa.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Tamms Silica Co., Chicago, Ill.
Taylor Sons Co., Charles, Cincinnati, O.
United States Register Co., Battle Creek, Mich.
United States Stoneware Co., New York, N. Y.
Walsh Refractories Corp., St. Louis, Mo.
Wilhelm Co., A., Reading, Pa.
● Wilson, Grant, Inc., Chicago, Ill. (Asbestos)

CEMENT, INSULATING

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alton Mineral Wool Insulation Co., St. Louis, Mo.
Babcock & Wilcox Co., New York, N. Y.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Carney Co., Inc., The, Mankato, Minn.
Chicago Fire Brick Co., Chicago, Ill.
Clinton Metallic Paint Co., Clinton, N. Y.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Diamond Chemical Products, New York, N. Y.
Eagle-Picher Lead Co., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
● Grant Wilson, Inc., Chicago, Ill.
Green Fire Brick Co., A. P., Mexico, Mo.
Industrial Research, Lansdowne, Pa.
International Vermiculite Co., Girard, Ill.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa. (85 per cent magnesia)
Krehbiel Co., J. H., Chicago, Ill. (Asbestos, mineral wool)
Laclede-Christy Clay Products Co., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Munn and Steele, Inc., Newark, N. J.
National Engineering Products, Inc., Washington, D. C.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Norristown Magnesia & Asbestos Co., Norristown, Pa.
Ohmlac Paint & Refining Co., New York, N. Y.
● Owens-Corning Fiberglas Corp., Toledo, O.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Peterson Co., B. A., Dowagiac, Mich.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Poe Co., C. W., Cleveland, O.
Preferred Utilities Mfg. Corp., New York, N. Y.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y.
● Rutland Fire Clay Co., Rutland, Vt.
Sall Mountain Co., Chicago, Ill.
Sauereisen Cements Co., Pittsburgh, Pa. (Electrical)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Tennessee Products Corp., Nashville, Tenn.
Thompson & Co., Pittsburgh, Pa.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Mineral Wool Co., Chicago, Ill.
Universal Zonolite Insulation Co., Chicago, Ill.
● Wilson, Inc., Grant, Chicago, Ill.

CENTRIFUGAL PUMPS

See Pumps, Centrifugal

CHAIN DRIVES

See Drives, Chain

CHAMBERS, COMBUSTION, PREFORMED

Amerform Corp., Philadelphia, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Chicago Fire Brick Co., Chicago, Ill.
Green Fire Brick Co., A. P., Mexico, Mo.
Harvey, Inc., Sid, Valley Stream, N. Y.
McLeod & Henry Co., Inc., Troy, N. Y.
Monogram Combustion Chamber Co., Philadelphia, Pa.
Munn and Steele, Inc., Newark, N. J. (light fired refractory)
Peterson Co., B. A., Dowagiac, Mich.
Petroleum Equipment Mfg. Co., New Haven, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Robinson Insulation Co., Great Falls, Mont.
Stuart Co., W. W., Des Moines, Ia.
Universal Zonolite Insulation Co., Chicago, Ill. (vermiculite concrete)

CHAMBERS, TEST, CONTROLLED TEMPERATURE AND HUMIDITY

American Coils, Inc., Newark, N. J.
Tenney Engineering, Inc., Newark, N. J.
York Corp., York, Pa.

CHANGERS, SPEED, HYDRAULIC COUPLING

American Blower Corp., Detroit, Mich.
Link-Belt Co., Philadelphia, Pa.

CHANGERS, SPEED, MECHANICAL

● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Browning Mfg. Co., Inc., Maysville, Ky.
Doall Co., The, Des Plaines, Ill.
Electric Machinery Mfg. Co., Minneapolis, Minn. (magnetic)
Graham Transmissions, Inc., Milwaukee, Wis.
Lewellen Mfg. Co., Columbus, Ind.
Link-Belt Co., Philadelphia, Pa.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Moore Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
Reeves Pulley Co., Columbus, Ind.
Salsbury Motors, Inc., Pomona, Calif.
Standard Transmission Equipment Co., Los Angeles, Calif.
● Stephens-Adamson Mfg. Co., Aurora, Ill.
Sterling Electric Motors, Inc., Los Angeles, Calif.

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U. S. Electrical Motors, Inc., Los Angeles, Calif.
Webster Electric Co., Racine, Wis.
White Mfg. Co., St. Paul, Minn.

CHECK VALVES

See Valves, Check

CHILLERS, WATER, FOR AIR CONDITIONING AND REFRIGERATION

• Acme Industries, Inc., Jackson, Mich.
• Baker Ice Machine Co., Inc., Omaha, Neb.
• Condenser Service & Engineering Co., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Filtrine Mfg. Co., Brooklyn, N. Y.
Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Griscom-Russell Co., The, New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Howe Ice Machine Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Larkin Coils, Atlanta, Ga.
McQuay, Inc., Minneapolis, Minn.
Niagara Blower Co., New York, N. Y.
• Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Phillips Cooling Tower Co., Inc., New York, N. Y.
Refrigeration Economics Co., Inc., Canton, O.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Temprite Products Corp., Detroit, Mich.
• Trane Co., The, La Crosse, Wis.
Vilter Mfg. Co., Milwaukee, Wis.
• Whitlock Mfg. Co., Hartford, Conn.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

CIRCULATORS FOR HOT WATER HEATING SYSTEMS

American-Marsh Pumps, Inc., Battle Creek, Mich.
• Bell & Gossett Co., Morton Grove, Ill.
Columbus Steam Pump Works Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
• Hoffman Specialty Co., Indianapolis, Ind.
Hotstream Heater Co., Cleveland, O.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Taco Heaters, Inc., New York, N. Y.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
White Flo-Matic Corp., Hoosick Falls, N. Y.

CLEANING MACHINES, PIPE

See Machines, Pipe Cleaning

CLAMPS, BEAM, PIPE HANGING

Acme Mfg. Co., Philadelphia, Pa.
Carpenter & Paterson, Inc., East Boston, Mass.
Chicago Nipple Mfg. Co., Chicago, Ill.
• Crane Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Frick Co., Waynesboro, Pa.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Jarecki Mfg. Co., Erie, Pa.
National Valve & Mfg. Co., Pittsburgh, Pa.
• Walworth Co., New York, N. Y.

CLAMPS, HOSE

Everhot Products Co., Chicago, Ill.
Marman Products Co., Inc., Inglewood, Calif.
• Tinnerman Products, Inc., Cleveland, O.

CLAMPS, PIPE REPAIR

Alten's Foundry & Machine Works, Lancaster, O.
Chelsea Metal Stamping Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Jarecki Mfg. Co., Erie, Pa.
Marman Products Co., Inc., Inglewood, Calif.
Skinner Co., M. B., South Bend, Ind.
Smooth-On Mfg. Co., Jersey City, N. J.
• Yarnall-Waring Co., Philadelphia, Pa.

CLAMPS, PIPE, WELDING

Detroit Stamping Co., Detroit, Mich.
Hercules Electric & Mfg., Co., Inc., Brooklyn, N. Y.
Jewel Mfg. Co., St. Paul, Minn.
Williams & Co., J. H., Buffalo, N. Y.

CLEANERS, AIR, ELECTRICAL

• American Air Filter Co., Inc., Louisville, Ky.
Drico Industrial Corp., New York, N. Y.
Raytheon Mfg. Co., Industrial Electronics Div., Waltham, Mass.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Thermix Engineering Co., Greenwich, Conn.

CLEANERS, TUBE

Albright Equipment Co., Johnstown, Pa.
Armstrong Mfg. Co., Bridgeport, Conn.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
• Condenser Service & Engineering Co., Hoboken, N. J.
Dudgeon, Inc., Richard, New York, N. Y.
Elliott Co., Jeannette, Pa.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Osborn Mfg. Co., Cleveland, O.
Perfection Grate & Stoker Co., Springfield, Mass.
Pierce Co., Wm. B., The, Buffalo, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Spencer Turbine Co., Hartford, Conn.
York Corp., York, Pa.

CLEANERS, VACUUM, FOR BOILERS

Ideal Industries, Inc., Sycamore, Ill.
Spencer Turbine Co., Hartford, Conn.
Whittington Pump & Engineering Co., Indianapolis, Ind.

CLEANING COMPOUNDS

See Compounds, Cleaning, Pipe Coil and Condenser

CLEANING COMPOUNDS, AIR FILTER

See Compounds, Cleaning, Air Filter

CLEANING MACHINES, PIPE

See Machines, Pipe Cleaning

COAL BURNERS

See Burners, Pulverized Coal; Stokers

COAL CONVEYORS

See Conveyors, Coal and Ash

COATINGS, PROTECTIVE, FOR METALS

Aeroil Products Co., West New York, N. J.
Alrose Chemical Co., Providence, R. I.
Amercoat Div., American Pipe & Construction Co., Los Angeles, Calif.
American Solder & Flux Co., Philadelphia, Pa. (Galvanizing powder)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y. (Pitch-base)
Blue Ridge Talc Co., Inc., Henry, Va.
Bonafide Genasco, Inc., New York, N. Y.
Bart Mfg. Co., Belleville, N. J.
Cabot Inc., Samuel, Boston, Mass. (Bituminous black paint)
Colonial Alloys Co., Metals, Div., Philadelphia, Pa.
Cordo Chemical Co., Norwalk, Conn.
Dampney Co. of America, Boston, Mass.
Dearborn Chemical Co., Chicago, Ill. (Rust preventive)
Debevoise Co., The, Brooklyn, N. Y.
Dow Corning Corp., Midland, Mich.
du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Flintkote Co., The, New York, N. Y. (Asphalt emulsions)
Galv-Weld Products, Dayton, O. (Regalvanizing)
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O.
Haering & Co., Inc., D. W., Chicago, Ill. (Drying and non-drying)
Houghton & Co., E. F., Philadelphia, Pa.
Johnson Co., Lloyd S., Chicago, Ill.
Laclede-Christy Clay Products Co., St. Louis, Mo. (High temperature paint)
Lastik Products Co., Inc., Pittsburgh, Pa.
Lithgow Corp., Chicago, Ill.
Midland Paint & Varnish Co., Cleveland, O.
Miracle Adhesives, Corp., Newark, N. J.
Mortell Co., J. W., Kankakee, Ill. (Asphalt)
National Lead Co., New York, N. Y. (Red lead)
Nebel Mfg. Co., Cleveland, O.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Nooter Boiler Works, John, St. Louis, Mo. (Metal spray, lead burning alloy sheet)
Ohmlac Paint & Refining Co., New York, N. Y. (Acid resistant, heat resistant)
Penn Galvanizing Co., Philadelphia, Pa. (Galvanizing)

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (Paint, varnish, laquer)
Preferred Utilities Mfg. Co., New York, N. Y.
Protective Coatings, Inc., Detroit, Mich.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reilly Tar & Chemical Corp., Indianapolis, Ind. (Coal tar base)
Rheem Mfg. Co., New York, N. Y.
● Ric-wiL Co., Cleveland, O.
Roxalin Flexible Finishes Inc., Elizabeth, N. J.
Ruberoid Co., New York, N. Y.
Saverite Engineering Co., Hoboken, N. J. (Tank coatings, rust preventive)
Sonneborn Sons, Inc., L., New York, N. Y.
Special Chemicals Corp., New York, N. Y. (Aluminum paint)
Tropical Paint & Oil Co., Cleveland, O.
Turco Products, Inc., Los Angeles, Calif.
United Chromium, Inc., New York, N. Y. (Chemical resisting organic coating)
United States Stoneware Co., New York, N. Y. (Corrosion resistant)
Vesco Corp., New York, N. Y.
Wailes Dove-Hermiston Corp., Westfield, N. J. (Coal tar)
Watson-Standard Co., Pittsburgh, Pa.
Wilbur & Williams Co., Boston, Mass.
Wipe-On Corp., Brooklyn, N. Y.
Wolfe-Kote Co., Sheboygan, Wis.
X-Pando Corp., Long Island City, N. Y.

COCKS, BOILER GAGE

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bordo Co., Inc., L. J., Glenside, Pa.
● Crane Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Klingerit, Inc., New York, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Marsh Corp., Jas. P., Chicago, Ill.
Reliance Gauge Column Co., Cleveland, O.
Williams Gauge Co., Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

COILS

See Surface, Cooling; Surface, Heating

COILS, FOR HOT WATER STORAGE TANKS

American Cooling Tower Co., Kansas City, Mo.
American District Steam Co., North Tonawanda, N. Y.
● Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Everhot Products Co., Chicago, Ill.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kopperman & Sons, Joseph, Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Oiljack Mfg. Co., Montclair, N. J.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Swan Engineering Co., Inc., Bloomfield, N. J.
Taco Heaters, Inc., New York, N. Y.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
● Whitlock Mfg. Co., Hartford, Conn.

COILS, PIPE

● Acme Industries, Inc., Jackson, Mich.
American Cooling Towers Co., Kansas City, Mo.
● Baker Ice Machine Co., Inc., Omaha, Neb.
Ball Welding Works, San Francisco, Calif.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Chicago Nipple Mfg. Co., Chicago, Ill.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
● Crane Co., Chicago, Ill.
Ellsworth Pipe & Suply Co., Milwaukee, Wis.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flori Pipe Co., The, St. Louis, Mo.
Frick Co., Waynesboro, Pa.
Harris & Co., Arthur, Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
● Mueller Brass Co., Port Huron, Mich.
National Pipe Bending Co., New Haven, Conn.
Ohio Pipe Bending & Machine Co., Cleveland, O.
Oiljack Mfg. Co., Montclair, N. J.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
● Rempe Co., Chicago, Ill.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Corp., New York, N. Y.
Shaw-Kendall Engineering Co., Toledo, O.
Swan Engineering Co., Inc., Bloomfield, N. J.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
● Whitlock Mfg. Co., Hartford, Conn.

COLLECTORS, DUST

Aerotec Co., White Plains, N. Y.
Aget-Detroit Co., Ann Arbor, Mich.
Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
Allington & Curtis Mfg. Co., Saginaw, Mich.
● American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., Detroit, Mich.
American Foundry Equipment Co., Mishawaka, Ind.
American Metal Porducts Co., Fort Worth, Tex.
Bargar Sheet Metal Co., Cleveland, O.
Bayley Blower Co., Milwaukee, Wis.
Blower Application Co., Milwaukee, Wis.
Bubar, Hudson H., Old Lyme, Conn.
● Buffalo Forge Co., Buffalo, N. Y.
Buffalo Tank Corp., Dunellen, N. J.
Centri-Spray Corp., Detroit, Mich. (Wet type)
Clark Dust Control Co., Chicago, Ill.
Columbian Steel Tank Co., Kansas City, Mo.
Day Co., The, Minneapolis, Minn.
Diamond Power Specialty Corp., Detroit, Mich.
Dust Filter Co., Chicago, Ill.
Goethel Sheet Metal Wks., Alfred, Milwaukee, Wis.
Ideal Industries, Inc., Sycamore, Ill.
Indiana Fan Company, Indianapolis, Ind.
Jacobs Co., B. & J., Cincinnati, O.
Kirk & Blum Mfg. Co., Cincinnati, O.
Kluegel & Co., E., St. Paul, Minn.
Knickerbocker Co., Jackson, Mich.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Lumm Co., A. H., Toledo, O.
Newcomb Engineering Co., Grand Rapids, Mich.
Nooter Boiler Works, John, St. Louis, Mo.
Northern Blower Co., Cleveland, O.
Pangborn Corp., Hagerstown, Md.
Peters-Dalton, Inc., Detroit, Mich.
Prat-Daniel Corp., Port Chester, N. Y.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Research Corp. New York, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.
Schmieg Industries, Detroit, Mich.
Schneible Co., Claude B., Detroit, Mich.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sly Mfg. Co., W. W., Cleveland, O.
Spencer Turbine Co., Hartford, Conn.
Steinhorst & Sons, Inc., Emil, Utica, N. Y.
Strandwitz & Co., Inc., W. J., Camden, N. J.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Thermix Engineering Co., Greenwich, Conn.
Torit Mfg. Co., St. Paul, Minn.
Western Blower Co., Seattle, Wash.
Western Precipitation Corp., Los Angeles, Calif.
Whiting Corp., Harvey, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

COLORIMETERS

Photovolt Corp., New York, N. Y.

COMBUSTION CHAMBERS

See Chambers, Combustion, Preformed

COMBUSTION CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion; Systems, Combustion Control

COMBUSTION RECORDERS

See Recorders, Carbon Dioxide

COMPOUNDS, AIR FRESHENING

Airkem, Inc., New York, N. Y.
Ampion Corp., Long Island City, N. Y.
Betz Corp., Hammond, Ind.

COMPOUNDS, BOILER CLEANING

Acme Refining Co., The, Cleveland, O.
Agnew & Tomlinson, Long Island City, N. Y.
American K. A. T. Corp., New York, N. Y.
American Teksag Products, Inc., Mount Vernon, N. Y.
● Anderson Stolz Corp., Kansas City, Mo.
● Apex Engineering Co., Chicago, Ill.
Aquatic Chemical Laboratories, Inc., New York, N. Y.
Bird-Archer Co., Philadelphia, Pa.
Blue Seal Chemical Co., Roselle Park, N. J.
Brown-Ford Corp., Newton, Mass.
Cannon Chemical Co., Inc., Everett, Mass.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
Diamond Chemical Products, New York, N. Y.
● Dowell Inc., Tulsa, Okla.
Ferro-Nil Corp., New York, N. Y.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Grief, Edward C., Bogota, N. J.
Haering & Co., Inc., D. W., Chicago, Ill.
• Hagan Corp., Pittsburgh, Pa.
Hercules Chemical Co., Inc., New York, N. Y.
Hood Refining Co., Greensburg, Pa.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Krehbiel Co., J. H., Chicago, Ill.
MacDermid Chemical Co., Bristol, Conn.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Aluminate Corp., Chicago, Ill.
North American Fibre Products Co., The, Cleveland, O.
Permutit Co., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Saverite Engineering Co., Hoboken, N. J.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
Water Service Laboratories, Inc., New York, N. Y.
Western Chemical Co., Kansas City, Mo.
• X Laboratories, Inc., New York, N. Y.

COMPOUNDS, BOILER AND RADIATOR SEALING

Ampion Corp., Long Island City, N. Y.
Atlas Chemical Co., Marietta, O.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Everett, Mass.
Chicago Specialty Mfg. Co., Chicago, Ill.
Cooper Sanitary Co., Philadelphia, Pa.
Dearborn Chemical Co., Chicago, Ill.
Desolvo Co., The, Pittsburgh, Pa.
Diamond Chemical Products, New York, N. Y.
Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.
Hampton-Cross Co., The, Louisville, Ky.
Hercules Chemical Co., Inc., New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Engineering Products, Inc., Washington, D. C.
Permatex Co., Inc., Brooklyn, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Star Products Co., New York, N. Y.
Utility Laboratories, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
• X Laboratories, Inc., New York, N. Y.

COMPOUNDS, CAULKING

Accurate Metal Weather Strip Co., New York, N. Y.
Acme Refining Co., The, Cleveland, O.
Acme White Lead & Color Works, Detroit, Mich.
Acorn Refining Co., Cleveland, O.
All Metal Weatherstrip Co., Chicago, Ill.
American-Marietta Co., Chicago, Ill.
American Metal Weather Strip Co., Grand Rapids, Mich.
Arco Co., Cleveland, O.
Armstrong Co., The, Detroit, Mich.
Asphalt Products Co., Syracuse, N. Y.
Babbitt Chemical Specialties Co., New York, N. Y.
Baldwin-Hill Co., Trenton, N. J.
Blue Ridge Talc Co., Henry, Va.
Calbar Paint & Varnish Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Cincinnati, O.
Carter Paint Co., Liberty, Ind.
Chamberlin Co. of America, Detroit, Mich.
Cheeseman-Elliot Co., Inc., Brooklyn, N. Y.
Continental Products Co., Euclid, O.
Cook Electric Co., Chicago, Ill.
Cordo Chemical Co., Norwalk, Conn.
Devoe & Raynolds Co., Inc., New York, N. Y.
Dow Corning Corp., Midland, Mich.
Eagle-Picher Co., Cincinnati, O.
Flintkote Co., The, New York, N. Y.
Ford Roofing Products Co., Chicago, Ill.
Goodrich Co., B. F., Akron, O.
Hetzel Roofing Products Co., Newark, N. J.
Horn Co., A. C., Long Island City, N. Y.
Iowa Paint Mfg. Co., Des Moines, Ia.
Johns-Manville, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Lastik Products Co., Inc., Pittsburgh, Pa.
Lehon Co., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Midand Paint & Varnish Co., Cleveland, O.
Mortell Co., J. W., Kankakee, Ill.
National Mfg. Corp., Tonawanda, N. Y.
Nebel Mfg. Co., Cleveland, O.
North American Fibre Products Co., The, Cleveland, O.
Ohmlac Paint & Refining Co., New York, N. Y.
Pecora Paint Co., Philadelphia, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plastic Products Co., Detroit, Mich.
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Sherwin-Williams Co., The, Cleveland, O.
Sipe & Co., James B., Pittsburgh, Pa.
Smooth-On Mfg. Co., Jersey City, N. J.
Sonneborn Sons, Inc., L., New York, N. Y.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Tamms Silica Co., Chicago, Ill.
Thompson & Co., Pittsburgh, Pa.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit, Mich.
United States Stoneware Co., New York, N. Y.
Wilhelm Co., A., Reading, Pa.
X-Pando Corp., Long Island City, N. Y.

COMPOUNDS, CLEANING, AIR FILTER

Oakite Products, Inc., New York, N. Y.
Turco Products, Inc., Los Angeles, Calif.

COMPOUNDS, CLEANING, PIPE COIL AND CONDENSER

• Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
• Apex Engineering Co., Chicago, Ill.
Aquatic Chemical Laboratories, Inc., New York, N. Y.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Everett, Mass.
Carolina Aniline & Extract Co., Inc., Charlotte, N. C.
Dearborn Chemical Co., Chicago, Ill.
• Dowell Inc., Tulsa, Okla.
Haering & Co., Inc., D. W., Chicago, Ill.
Hercules Chemical Co., Inc., New York, N. Y.
MacDermid Chemical Co., Bristol, Conn.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
North American Fibre Produca Co., The, Cleveland, O.
Oakite Products, Inc., New York, N. Y.
Radiator Specialty Co., Charlotte N. C.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory Inc., Brooklyn, N. Y.
Western Chemical Co., Kansas City, Mo.

COMPOUNDS, WELDING

• Acme Industries, Inc., Jackson, Mich.
American Solder & Flux Co., Philadelphia, Pa.
Midland Paint & Varnish Co., Cleveland, O.
Sight Feed Generator Co., Richmond, Ind.
Special Chemicals Corp., New York, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Universal Power Corp., Cleveland, O.
Wolfe-Kote Co., Sheboygan, Wis.

COMPRESSION PIPE FITTINGS

See Fittings, Pipe, Compression

COMPRESSOR BASES

See Bases and Pads, Vibration Isolating

COMPRESSOR VALVES

See Valves, Compressor

COMPRESSORS, AIR

Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Beach-Russ Co., New York, N. Y.
Binks Mfg. Co., Chicago, Ill.
Brunner Mfg. Co., Utica, N. Y.
Buffalo Turbine Corp., Buffalo, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Circulators & Devices Mfg. Corp., New York, N. Y.
Cooper-Bessemer Corp., Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Davey Compressor Co., Kent, O.
Dayton Air Compressor Co., Dayton, O.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Essick Mfg. Co., Los Angeles, Calif.
Fuller Co., Catasauqua, Pa.
Gardner-Denver Co., Quincy, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Hobart Bros. Co., Troy, O.
Ingersoll-Rand Co., New York, N. Y.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind.
Lammert & Mann Co., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Nash Engineering Co., South Norwalk, Conn.
North Penn Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Plummer Spray Equipment Co., Napoleon, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Schramm, Inc., West Chester, Pa.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Div. of Wetsinghouse Electric, Hyde Park, Boston, Mass.
Trimount Rotary Power Co., East Dedham, Mass.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Waukesha Motor Co., Waukesha, Wis.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

COMPRESSORS, REFRIGERATING, CENTRIFUGAL

Carrier Corp., Syracuse, N. Y. (Carrene)
DeLaval Steam Turbine Co., Trenton, N. J. (Water vapor)
● Trane Co., The, La Crosse, Wis.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

COMPRESSORS, REFRIGERATING, RECIPROCATING

● Airtemp, Div. of Chrysler Corp., Dayton, O. (Radial)
● Baker Ice Machine Co., Inc., Omaha, Neb. ("Freon," Methyl chloride, Ammonia)
Brunner Mfg. Co., Utica, N. Y. (Methyl chloride, "Freon," sulphur dioxide)
Carrier Corp., Syracuse, N. Y. ("Freon")
Controldtemp Equipment Sales Corp., Brooklyn, N. Y.
Coolstream Corp., Brooklyn, N. Y.
Copeland Refrigeration Corp., Sidney, O.
● Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Diceler Div. of General Machine & Mfg. Co., Berwick, Pa.
Frick Co., Waynesboro, Pa. (Ammonia, carbon dioxide, methyl chloride, "Freon")
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Machinery Co., Spokane, Wash.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Howe Ice Machine Co., Chicago, Ill. ("Freon," ammonia, methyl chloride)
Ingersoll-Rand Co., New York, N. Y.
Jack & Heintz Precision Industries, Inc., Cleveland, O.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kelvinator Div., Nash-Kelvinator Corp., Detroit, Mich.
Lehigh Foundries, Inc., Refrigeration Div., Lancaster, Pa.
Lynch Mfg. Corp., Toledo, O.
Mills Industries, Inc., Chicago, Ill.
Reliance Refrigerating Machine Co., Chicago, Ill. ("Freon," methyl chloride, ammonia)
Reynolds Mfg. Co., Inc., Springfield, Mo.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind. ("Freon," methyl chloride)
Starr Piano Co., Richmond, Ind.
Stewart Ice Machine Co., Los Angeles, Calif.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Tecumseh Products Co., Tecumseh, Mich.
● Trane Co., The, La Crosse, Wis.
Universal Cooler Div. of International Detrola Corp., Marion, O. (Methyl chloride, "Freon")
Vilter Mfg. Co., Milwaukee, Wis. ("Freon," ammonia)
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill. ("Freon," methyl chloride)
Wittenmeier Machinery Co., Chicago, Ill. (Carbon dioxide)
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill. (Ammonia, methyl chloride)
York Corp., York, Pa. (Carbon dioxide, ammonia, "Freon")

COMPRESSORS, REFRIGERATING, STEAM JET

Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.
Graham Mfg. Co., Inc., New York, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.

COMPRESSORS, STEAM BOOSTER

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Buffalo Turbine Corp., Buffalo, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
● Worthington Pump & Machinery Corp., Harrison, N. J.

CONDENSATION METERS

See Meters, Condensation

CONDENSATION PUMPS

See Pumps, Condensation

CONDENSER TUBES

See Tubes, Condenser

CONDENSERS, REFRIGERATING, EVAPORATIVE

● Acme Industries, Inc., Jackson, Mich.
American Cooling Tower Co., Kansas City, Mo.
● Baker Ice Machine Co., Inc., Omaha, Neb.
● Baltimore Aircoil Co., Baltimore, Md.
● Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y. ("Freon," ammonia)
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
● Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
G & O Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
● Governair Corp., Oklahoma City, Okla.
Harry Cooling Towers, Inc., New York, N. Y.
Hess Warming & Ventilating Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Larkin Coils, Atlanta, Ga.
Long Mfg., Div. Borg-Warner Corp., Detroit, Mich.
● Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
● Murray Mfg. Co., D. J., Wausau, Wis.
● New England Cooling Tower Co., Boston, Mass.
Niagara Blower Co., New York, N. Y.
● Peerless of America, Inc., Chicago, Ill.
● Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Trane Co., The, La Crosse, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Waukesha Motor Co., Waukesha, Wis.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
XL Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND COIL

● Acme Industries, Inc., Jackson, Mich.
● Baker Ice Machine Co., Inc., Omaha, Neb.
Ball Welding Works, San Francisco, Calif.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
Champion Unit Heater Co., Chicago, Ill.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Nooter Boiler Works, John, St. Louis, Mo.
Refrigeration Economics Co., Inc., Canton, O.
Rome-Turney Radiator Co., Rome, N. Y.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Vilter Mfg. Co., Milwaukee, Wis.
● Whitlock Mfg. Co., Hartford, Conn.
Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND TUBE

● Acme Industries, Inc., Jackson, Mich.
● Airtemp, Div. of Chrysler Corp., Dayton, O.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Andale Co., Philadelphia, Pa.
● Baker Ice Machine Co., Inc., Omaha, Neb.
Ball Welding Works, San Francisco, Calif.
Biggs Boiler Works Co., E. Akron, O.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
Carrier Corp., Syracuse, N. Y. (Carrene)
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
● Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Kramer Trenton Co., Trenton, N. J.
Nooter Boiler Works, John, St. Louis, Mo.
Ohio Pipe Bending & Machine Co., Cleveland, O.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
● Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Economics Co., Inc., Canton, O.
Reliance Refrigerating Machine Co., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Richmond Engrg. Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind.
Standard Heater & Oil Equipment Co., Jersey City, N. J.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Stewart Ice Machine Co., Los Angeles, Calif.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
• Trane Co., The, LaCrosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Whitlock Mfg. Co., Hartford, Conn.
Wittenmeier Machinery Co., Chicago, Ill.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

CONDENSERS, WATER DISTRIBUTORS FOR

See Distributors, Water, for Condensers

CONDENSING UNITS

See Compressors

CONDUIT, UNDERGROUND PIPING

American District Steam Co., North Tonawanda, N. Y.
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Dockstader, Inc., S. E., Washington, D. C.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fibre Conduit Co., Orangeburg, N. Y.
Johns-Manville, New York, N. Y.
Kaiser Co., E. B., Chicago, Ill.
Michigan Pipe Co., Bay City, Mich.
• Porter & Co., Inc., H. W., Newark, N. J.
• Ric-wiL Co., Cleveland, O.
• Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Underground Steam Construction Co., Boston, Mass.
Wyckoff & Son Co., A., Elmira, N. Y.

CONNECTIONS, DUCT, FLEXIBLE (ASBESTOS, CANVAS, ETC.)

Canvas Products Co., St. Louis, Mo.
Chicago Metal Hose Corp., Maywood, Ill.
Felters Company, The, Boston, Mass.
• Grant Wilson, Inc., Chicago, Ill.
United States Rubber Co., New York, N. Y.
• Wilson, Inc., Grant, Chicago, Ill. (Asbestos)

CONNECTORS, FOR NON-METALLIC DUCT FABRICATION

Acme Steel Co., Chicago, Ill. (Strapping)
• Dravo Corp., Pittsburgh, Pa.
Klomparens Lock-Joint Mfg. Co., Inc., Washington, D. C.
Lumm Co., A. H., Toledo, O.
Sheetlock Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.

CONTINUOUS HEATERS

See Heaters, Steam Jet, for Liquids

CONTROL, FOR INDIRECT WATER HEATERS

Armstrong Heat Control Co., Portland, Ore.
Barber-Colman Co., Rockford, Ill.
• Bell & Gossett Co., Morton Grove, Ill.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
• Detroit Lubricator Co., Detroit, Mich.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Penn Electric Switch Co., Goshen, Ind.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Taco Heaters, Inc., New York, N. Y.
• Thrush & Co., H. A., Peru, Ind.

CONTROLLERS AND STARTERS, MOTOR

• Allen-Bradley Co., Milwaukee, Wis.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
B/W Controller Corp., Birmingham, Mich.
Borg-Erickson Corp., Chicago, Ill.
Chase-Shawmet Co., Newberyport, Mass.
Clark Controller Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Co., Minneapolis, Minn. (Synchronous motor)
Hart Mfg. Co., Hartford, Conn.
Master Electric Co., Dayton, O.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Monitor Controller Co., The, Baltimore, Md.
Reynolds Electric Co., Chicago, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Zenith Electric Co., Chicago, Ill.

CONTROLS, AIR CONDITIONING

See Humidistats; Indicator-Controllers; Operators, Dampers; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Thermostats; Valves, Diaphragm; Valves, Refrigeration; Valves, Solenoid

CONTROLS, DOOR, ELECTRIC EYE (FOR AIR CONDITIONED ROOMS)

Electric Service Control, Inc., Newark, N. J.
Ess Specialty Corp., Bergenfield, N. J.
Stanley Works, The, New Britain, Conn.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Yale & Towne Mfg. Co., Stamford, Conn.

CONTROLS, DRAFT, BAROMETRIC

Atlas Utilities Co., Inc., Providence, R. I.
Barber-Colman Co., Rockford, Ill.
Campbell Engineering Co., Appleton, Wis.
Cole-Sewell Engineering Co., St. Paul, Minn.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Hotstream Heater Co., Cleveland, O.
Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Simplex Mfg. Co., Fond du Lac, Wis.

CONTROLS, FIRE PROTECTION SPRINKLER SYSTEMS

American District Telegraph Co., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cook Electric Co., Chicago, Ill.
• Grinnell Co., Inc., Providence, R. I.
• Mercoid Corp., The, Chicago, Ill.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Synchro-Start Products, Chicago, Ill.
Worner Electronic Devices, Rankin, Ill.

CONTROLS, FLAME FAILURE

American District Telegraph Co., New York, N. Y.
Combustion Control Corp., Cambridge, Mass.
Ess Specialty Corp., Bergenfield, N. J.
• General Controls Co., Glendale, Calif.
• Mettler Co., Lee B., Los Angeles, Calif.
• Penn Electric Switch Co., Goshen, Ind.
Webster Engineering Co., Tulsa, Okla.
• Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.

CONTROLS, HEATING

See Alarms; Humidistats; Indicator-Controllers; Operators, Damper; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Systems, Combustion Control; Systems, Heating; Thermostats; Valves, Balancing, Radiator; Valves, Diaphragm; Valves, Flow Control; Valves, Mixing; Valves, Pressure Reducing and Regulating; Valves, Radiator; Valves, Solenoid

CONTROLS, PUSH-PULL

See Shafts, Flexible, Push-Pull, for Control

CONTROLS, REFRIGERATION

See Humidistats; Operators, Valves; Relays; Switches; Thermostats; Valves, Refrigeration; Valves, Solenoid

CONVECTORS

See Radiation, Convection Type

CONVEYORS, COAL AND ASH

Chain Belt Co., Milwaukee, Wis.
Farquhar Co., A. B., York, Pa.
Jeffrey Mfg. Co., Columbus, O.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind.
La-Del Div.—Joy Mfg. Co., New Philadelphia, O.
Link-Belt Co., Chicago, Ill.
• Mercoid Corp., The, Chicago, Ill.
Sprout, Waldron & Co., Muncy, Pa.
Standard Transmission Equipment Co., Los Angeles, Calif.
• Stephens-Adamson Mfg. Co., Aurora, Ill.

COOLERS, OIL

• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Andale Co., Philadelphia, Pa.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
• Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div., of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.

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Frank Heaters, Inc., Paterson, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
G & O Mfg. Co., New Haven, Conn.
Griscom-Russell Co., The, New York, N. Y.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Modine Mfg. Co., Racine, Wis.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Pipe Bending Co., New Haven, Conn.
• Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Struthers Wells Corp., Titusville, Pa.
• Trane Co., The, La Crosse, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Whitlock Mfg. Co., Hartford, Conn.
Winslow Engineering Co., Oakland, Calif.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

COOLERS, UNIT (FLOOR TYPE)

Not air conditioning units, but floor mounted unit with coil and centrifugal fans without filters, for connection to remote compressor or cold water supply. For air conditioning units see Units, Air Conditioning

• Acme Industries, Inc., Jackson, Mich.
American Blower Corp., Detroit, Mich.
American Coils, Inc., Newark, N. J.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Beacon-Morris Corp., Boston, Mass. (Custom built)
• Buffalo Forge Co., Buffalo, N. Y.
• Bush Mfg. Co., Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Conditionaire Unit Co., Chicago, Ill.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Economy Equipment Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
• Governair Corp., Oklahoma City, Okla.
Howe Ice Machine Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
• Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
Manufacturers Fin Coil Co., Chicago, Ill.
• Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
• Murray Mfg. Co., D. J., Wausau, Wis.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Steamaire Co., Cincinnati, O.
• Trane Co., The, La Crosse, Wis.
• United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Westinghouse Electric Corp., East Pittsburgh, Pa.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

COOLERS, UNIT (SUSPENDED TYPE)

Not air conditioning units, but suspended unit with coil and propeller fan, without filters, for connection to remote compressor or cold water supply. For air conditioning units, see Units, Air Conditioning

American Blower Corp., Detroit, Mich.
American Coils, Inc., Newark, N. J.
American Cooling Tower Co., Kansas City, Mo.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Beacon-Morris Corp., Boston, Mass. (Custom built)
Bern's Specialty Mfg. Co., Chicago, Ill.
Betz Corp., Hammond, Ind.
• Buffalo Forge Co., Buffalo, N. Y.
• Bush Mfg. Co., Hartford, Conn.
Campbell Heating Co., E. K., Kansas City, Mo.
Carrier Corp., Syracuse, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Conditionaire Unit Co., Chicago, Ill.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Economy Equipment Co., Chicago, Ill.
• Fedders-Quigan Corp., Buffalo, N. Y.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
• Governair Corp., Oklahoma City, Okla.
Howe Ice Machine Co., Chicago, Ill.
• Ilg Electric Ventilating Co., Chicago, Ill.
Johnson Fan & Blower Corp., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
• Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
Manufacturers Fin Coil Co., Chicago, Ill.
• Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
• Murray Mfg. Co., D. J., Wausau, Wis.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
• Rempe Co., Chicago, Ill.
• Rittling Corp., The, Buffalo, N. Y.
• Skinner Heating & Ventilating Co., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
Thermal Co., Inc., Milwaukee, Wis.
• Trane Co., The, La Crosse, Wis.
• United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Westinghouse Electric Corp., East Pittsburgh, Pa.
• Wing Mfg. Co., L. J., New York, N. Y.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

COOLERS, WATER, DRINKING

Coolstream Corp., The, Brooklyn, N. Y.
Doyle & Roth Mfg. Co., Newark, N. J.
Filtrine Mfg. Co., Brooklyn, N. Y.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Temprite Products Corp., Detroit, Mich.
Uniflow Mfg. Co., Erie, Pa.
Westinghouse Electric Corp., Springfield, Mass.

COOLING COILS

See Surface, Cooling

COOLING SURFACE

See Surface, Cooling

COOLING TOWERS

See Towers, Cooling

COOLING UNITS

See Units, Air Conditioning; Coolers, Unit

COPPER PIPE

See Pipe, Brass and Copper

COPPER SHEETS

See Sheets, Copper

COPPER TUBE FITTINGS

See Fittings, Copper Tube

COPPER TUBE FITTINGS, FLARED

See Fittings, Copper Tube, Flared

COPPER TUBING

See Tubing, Brass and Copper

CORROSION PREVENTIVES

See Treatment, Steam System, to Inhibit Corrosion; and Treatment, Water, to Inhibit Corrosion

COUNTERS, DUST

Bausch & Lomb Optical Co., Rochester, N. Y.
Service to Industry, West Hartford, Conn.
Willson Products, Inc., Reading, Pa.

COUPLINGS, FLEXIBLE, POWER TRANSMISSION

Ajax Flexible Coupling Co., Westfield, N. Y.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Flexible Coupling Co., Erie, Pa.
Blood Brothers Machine Co., Allegan, Mich. (Universal joints)
Boston Gear Wks., Inc., North Quincy, Mass.
Brooks Equipment Corp., Hoboken, N. J.
Browning Mfg. Co., Inc., Maysville, Ky.
Caldwell Co., W. E., Louisville, Ky.
Certified Flexible Couplings, New York, N. Y.
Chain Belt Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.

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Congress Die Casting Div., Congress Tool & Die Co., Detroit, Mich.
Continental Diamond Fibre Co., Newark, Del.
Crocker-Wheeler Electric Mfg. Co. Div., Joshua Hendy Iron Works, Ampere, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Guardian Products Corp., Michigan City, Ind.
Irving Flexible Coupling Co., Los Angeles, Calif.
Jeffrey Mfg. Co., Columbus, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Link-Belt Co., Indianapolis, Ind.
Lord Mfg. Co., Erie, Pa.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Medart Co., St. Louis, Mo.
Mercury Clutch Corp., Canton, O.
Moran Flexible Joint Co., Inc., Louisville, Ky.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Poole Foundry & Machine Co., Baltimore, Md.
Ramsey Chain Co., Inc., Albany, N. Y.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
Shallcross Co., Philadelphia, Pa.
Sprout, Waldron & Co., Muncy, Pa.
Stewart-Rogers, Inc., Philadelphia, Pa.
Stow Mfg. Co., Binghampton, N. Y.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Waldron Corp., John, New Brunswick, N. J.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Whitney Chain & Mfg. Co., The, Hartford, Conn.
Wood's Sons Co., T. B., Chambersburg, Pa.

COUPLINGS, PIPE

Aeroquip Corp., Jackson, Mich.
Alabama Pipe Co., Anniston, Ala. (Cast iron)
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Chase Brass & Copper Co., Waterbury, Conn.
Champion Machine & Forging Co., Cleveland, O.
Clow & Sons, James B., Chicago, Ill.
Colonial Alloys Co., Metals Div., Philadelphia, Pa. (Stainless)
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Dillon Co., Tulsa, Okla.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Drinkwater, Inc., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Malleable Iron Fittings Co., Branford, Conn.
• Mueller Brass Co., Port Huron, Mich.
National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Republic Steel Corp., Cleveland, O.
Rhode Island Fittings Co., Hillsgrove, R. I.
Semler Co., Jeannette, Pa.
Stockham Pipe Fittings Co., Birmingham, Ala.
Stokes Molded Products, Trenton, N. J. (Hard rubber)
Superior Railway Products Corp., Pittsburgh, Pa.
Union Metal Works, Chelsea, Mass.
United States Stoneware Co., New York, N. Y.
Victaulic Co. of America, New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
• Watson-Stillman Co., Roselle, N. J.
Weatherhead Co., Cleveland, O.
Wheeling Machine Products Co., Wheeling, W. Va.
• Youngstown Sheet & Tube Co., Youngstown, O.

COUPLINGS, PIPE, DETACHABLE

Aeroquip Corp., Jackson, Mich.
Drinkwater, Inc., Chicago, Ill.
Gates Engineering Co., Wilmington, Del.
Packless Metal Products Corp., New Rochelle, N. Y.
Roylyn, Inc., Glendale, Calif.
Victaulic Co. of America, New York, N. Y.
Wiggins Oil Tool Co., Inc., E. B., Los Angeles, Calif.

CUT-OFFS, LOW WATER, HEATING BOILER

B/W Controller Corp., Birmingham, Mich.
Combustion Control Corp., Cambridge, Mass.
Eclipse Fuel Engineering Co., Rockford, Ill.
• General Controls Co., Glendale, Calif.
• Johnson Corp., Three Rivers, Mich.
Magnetrol, Inc., Chicago, Ill.
• Maid-O-Mist, Inc., Chicago, Ill.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• McDonnell & Miller, Chicago, Ill.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Watts Regulator Co., Lawrence, Mass.
• Webster & Co., Warren, Camden, N. J.

CUTTERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Atkins & Co., E. C., Indianapolis, Ind.
Barnes Tool Co., The, New Haven, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Bernz Co., Inc., Otto, Rochester, N. Y.
C-B Tool Co., Lancaster, Pa.
Crown Die & Tool Co., Chicago, Ill.
Erie Tool Works, Erie, Pa.
Everhot Products Co., Chicago, Ill.
Hollands Mfg. Co., Erie, Pa.
International Nutyp Tool Co., Oswego, N. Y.
National Machine Wks., Chicago, Ill.
Nye Tool & Machine Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
• Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.
Trimont Mfg. Co., Boston, Mass.
Wallace Supplies Mfg. Co., Chicago, Ill.

CUTTERS, TUBING

Armstrong Mfg. Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Bernz Co., Inc., Otto, Rochester, N. Y.
Bonney Forge & Tool Works, Allentown, Pa.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Machine-Craft Mfg. Co., Los Angeles, Calif.
• Mueller Brass Co., Port Huron, Mich.
Nye Tool & Machine Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Perfection Refrigeration Parts Co., Harvey, Ill.
• Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Boston, Mass.
Wallace Supplies Mfg. Co., Chicago, Ill.
Weatherhead Co., Cleveland, O.

DAMPER OPERATORS

See Operators, Damper

DAMPER REGULATORS

See Regulators, Damper Sets

DAMPERS, DUCT, MANUALLY OPERATED

Acme Mfg. Co., Philadelphia, Pa.
Adams Co., The, Dubuque, Ia.
Air Conditioning Products Co., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
Belanger Fan & Blower Co., Detroit, Mich.
Corbman Bros., Inc., Philadelphia, Pa.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Excelsior Steel Furnace Co., Chicago, Ill.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Jacobs Co., B. & J., Cincinnati, O.
Kerentoff, G. L., Cincinnati, O.
Martens & Stormoen, Boston, Mass.
Meyer Mfg. Co., Detroit, Mich.
Milcor Steel Co., Milwaukee, Wis.
Ohio Products Co., Cleveland, O.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
Salina Metal Products Co., Salina, Kan.
Sioux Steel Co., Sioux Falls, S. D.
Standard Furnace & Supply Co., Omaha, Neb.
United States Register Co., Battle Creek, Mich.
Young Regulator Co., Cleveland, O.

DAMPERS, DUCT, REMOTE CONTROLLED

Air Conditioning Products Co., Detroit, Mich.
American Warming & Ventilating Co., Toledo, O.
• Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Belanger Fan & Blower Co., Detroit, Mich.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
• Johnson Service Co., Milwaukee, Wis.
Meyer Mfg. Co., Detroit, Mich.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Shalcross Controls, Inc., Milwaukee, Wis.
Stuart Co., W. W., Des Moines, Ia.
Thermix Engineering Co., Greenwich, Conn.

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● Tuttle & Bailey, Inc., New Britain, Conn.
Vapor Car Heating Co., Inc., Chicago, Ill.
Young Regulator Co., Cleveland, O.

DEAERATORS

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Buflovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
Cochrane Corp., Philadelphia, Pa.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Heat Transfer Products, Inc., Carbondale, Pa.
Hoppes Mfg. Co., Springfield, O.
Permutit Co., New York, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
● Whitlock Mfg. Co., Hartford, Conn.
● Worthington Pump & Machinery Corp., Harrison, N. J.

DEEP WELL PUMPS

See Pumps, Deep Well

DEHUMIDIFIERS, ABSORPTION AND ADSORPTION

● Air & Refrigeration Corp., New York, N. Y.
Aqua-Sorb Co., East Orange, N. J.
Bryant Heater Co., The, Cleveland, O.
Carbide and Carbon Chemicals Corp., New York, N. Y. (Triethylene Glycol)
Cargocaire Engineering Corp., New York, N. Y. (for ships)
Carrier Corp., Syracuse, N. Y.
Davison Chemical Corp., The, Baltimore, Md.
Dow Chemical Co., The, Midland, Mich.
Drying Systems, Inc., Chicago, Ill.
Floridin Co., Warren, Pa.
Kaufman Co., H. J., Detroit, Mich.
Morf Industries, Inc., Staten Island, N. Y.
● Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.
● Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Research Corp., New York, N. Y.
Rogers Companies, Inc., R. B., (Rogers-Research Div.) New York, N. Y. (Triethylene glycol)
Solvay Sales Corp., New York, N. Y.
Somers, Inc., Detroit, Mich.
Surface Combustion Corp., Toledo, O.
Tamms Silica Co., Chicago, Ill.

DEHUMIDIFYING UNITS

See Units, Air Conditioning; Dehumidifiers, Absorption and Adsorption

DEHYDRANT AND ACID NEUTRALIZER, FOR REFRIGERATING SYSTEMS

Davison Chemical Corp., The, Baltimore, Md.
Highside Chemicals Co., Newark, N. J.
● Mueller Brass Co., Port Huron, Mich.
Weatherhead Co., Cleveland, O.

DEHYDRATORS, REFRIGERANT

● Aluminum Co. of American, Pittsburgh, Pa.
American Injector Co., Detroit, Mich.
● Automatic Products Co., Milwaukee, Wis.
Davison Chemical Corp., The, Baltimore, Md.
Floridin Co., Warren, Pa.
Gasflux Co., Mansfield, O.
● Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Joliet Chemicals, Inc., Joliet, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
● Mueller Brass Co., Port Huron, Mich.
Sporlan Valve Co., St. Louis, Mo.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Weatherhead Co., Cleveland, O.
Western Thermal Equipment Co., Los Angeles, Calif.

DESTROYERS, SOOT, CHEMICAL

Ampion Corp., Long Island City, N. Y.
Desolvo Co., The, Pittsburgh, Pa.
Diamond Chemical Products, New York, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Chemical Co., Inc., New York, N. Y.
MacDermid Chemical Co., Bristol, Conn.
Saverite Engineering Co., Hoboken, N. J.
Tamms Silica Co., Chicago, Ill.
Vinco Co., Inc., The, New York, N. Y.

DESUPERHEATERS, STEAM

Babcock & Wilcox Co., New York, N. Y.
Brown Fintube Co., The, Elyria, O.
Cochrane Corp., Philadelphia, Pa.
Drico Industrial Corp., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
● Hagan Corp., Pittsburgh, Pa.
Northern Equipment Co., Erie, Pa.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
● Whitlock Mfg. Co., Hartford, Conn.

DETECTORS, LEAK, REFRIGERANT

Bernz Co., Inc., Otto, Rochester, N. Y.
Davis Emergency Equipment Co., Newark, N. J.
Highside Chemicals Co., Newark, N. J.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Turner Brass Wks., Sycamore, Ill.
● Western Thermal Equipment Co., Los Angeles, Calif.

DIAPHRAGM VALVES

See Valves, Diaphragm

DIESEL ENGINES

See Engines, Diesel, for Fan, Pump and Compressor Drives

DIFFUSERS, AIR, HIGH VELOCITY

See also Grilles; Panels, Perforated, for Air Diffusion; Registers
A-J Mfg. Co., Kansas City, Mo.
● Air Devices, Inc., New York, N. Y.
● Anemostat Corp. of America, New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Connor Engineering Corp., W. B., New York, N. Y.
Demuth & Sons, Charles, Mineola, L. I., N. Y.
● Tuttle & Bailey, Inc., New Britain, Conn.
● Waterloo Register Sales Co., Waterloo, Ia.
Wilster Air Devices, Inc., Cleveland, O.

DIFFUSION, AIR

See Panels, Perforated, for Air Diffusion

DISTRIBUTORS, WATER, FOR CONDENSERS

● Martocello & Co., Jos. A., Philadelphia, Pa.
York Corp., York, Pa.

DOOR CONTROLS

See Controls, Door, Electric Eye

DOORS AND PANELS, ACCESS

American Foundry & Furnace Co., Bloomington, Ill.
American Sheet Metal Works, New Orleans, La.
● Auer Register Co., Cleveland, O.
Biersach & Niedermeyer Co., Milwaukee, Wis.
● Clarage Fan Co., Kalamazoo, Mich.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Decatur Iron & Steel Co., Decatur, Ala.
Falstrom Co., Passaic, N. J.
Kirk & Blum Mfg. Co., Cincinnati, O.
Lockjoint Wood Products Co., Wichita, Kan.
Lumm Co., A. H., Toledo, O.
Milcor Steel Co., Milwaukee, Wis.
Rock Island Register Co., Rock Island, Ill.
Technical Ply-Woods, Chicago, Ill.
Truscon Steel Co., Youngstown, O.
Way Loctor Access Panel Co., Boston, Mass.
Western Wire & Iron Works, Inc., Chicago, Ill. (Metal)

DRAFT CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAFT GAGES

See Gages, Indicating, Draft

DRAFT RECORDERS

See Recorders, Draft

DRAFT REGULATORS

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAWING TEMPLATES, PIPING

See Templates, Drawing, Piping

DRILLS, ELECTRIC, PORTABLE

Albertson & Co., Inc., Sioux City, Ia.
● Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., New York, N. Y.
Cincinnati Electrical Tool Co., The, Cincinnati, O.
Clark, Jr., Electric Co., Jas., Louisville, Ky.
Duro Metal Products Co., Chicago, Ill.
Independent Pneumatic Tool Co., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Mall Tool Co., Chicago, Ill.
Millers Falls Co., Greenfield, Mass.
Misener Mfg. Co., Inc., Syracuse, N. Y.
Paramount Products Co., New York, N. Y.
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw, Inc., Chicago, Ill.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Syntron Co., Homer City, Pa.
U. S. Electrical Tool Co., Cincinnati, O.
Van Dorn Electric Tool Co., Towson, Md.
Willy's Carbide Tool Co., Detroit, Mich.
Wodack Electric Tool Corp., Chicago, Ill.

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DRIVES, CHAIN

Caldwell Co., W. E., Louisville, Ky.
Chain Belt Co., Milwaukee, Wis.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Horton Mfg. Co., Minneapolis, Minn.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Whitney Chain & Mfg. Co., The, Hartford, Conn.

DRIVES, FLAT BELT

See also Belting, Leather and Belting, Rubber

American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Caldwell Co., W. E., Louisville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Dick Co., Inc., R. & J., Passaic, N. J.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Horton Mfg. Co., Minneapolis, Minn.
Medart Co., St. Louis, Mo.
Remco Products Corp., York, Pa.
Rhoads & Sons, J. E., Philadelphia, Pa.
Rockwood Mfg. Co., Indianapolis, Ind.
Williams & Son, I. B., Dover, N. H.
Wood's Sons Co., T. B., Chambersburg, Pa.

DRIVES, V BELT

• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Congress Die Casting Div., Congress Tool & Die Co., Detroit, Mich.
Continental Rubber Wks., Erie, Pa.
Dayton Rubber Mfg. Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga.
Goodrich Co., B. F., Akron, O.
Horton Mfg. Co., Minneapolis, Minn.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Remco Products Corp., York, Pa.
Rockwood Mfg. Co., Indianapolis, Ind.
Salsbury Motors, Inc., Pomona, Calif.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Wood's Sons Co., T. B., Chambersburg, Pa.
• Worthington Pump & Machinery Corp., Harrison, N. J.

DRIVES, VARIABLE SPEED

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

DRYERS, INDUSTRIAL (COMPARTMENT, TUNNEL CONVEYOR, VACUUM, SPRAY, ROTARY, ETC.)

Bowen Engineering Corp., Garwood, N. J.
Buffovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
• Campbell Heating Co., Des Moines, Ia.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Despatch Oven Co., Minneapolis, Minn.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Hersey Mfg. Co., South Boston, Mass.
Instant Drying Corp., New York, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Indianapolis, Ind.
Louisville Drying Machinery Co., Louisville, Ky.
Peters-Dalton, Inc., Detroit, Mich.
Proctor & Schwartz, Inc., Philadelphia, Pa.
Raymond Pulverizer Div., Combustion Engineering Co., Chicago, Ill.
Ross Engineering Corp., J. O., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Stokes Machine Co., F. J., Philadelphia, Pa.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Western Precipitation Corp., Los Angeles, Calif.

DUAL THERMOSTATS

See Thermostats, Two Temperature or Dual

DUCT CONNECTIONS

See Connections, Duct, Flexible; Connectors for Non-Metallic Duct Fabrication

DUCT HEATERS

See Heaters, Duct

DUCT INSULATION

See Insulation, Duct

DUCT THERMOSTATS

See Thermostats, Duct Type

DUCT TURNING VANES

See Vanes, Duct Turning, Prefabricated

DUCTS AND DUCT FITTINGS, PREFABRICATED, METALLIC

Acer & Whedon, Inc., Medina, N. Y.
Acme Mfg. Co., Philadelphia, Pa.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
American Ventilating Hose Co., New York, N. Y.
Champion Furnace Pipe Co., Peoria, Ill.
Char-Gale Mfg. Co., Minneapolis, Minn.
Chicago Furnace Supply Co., Chicago, Ill.
Chicago Metal Hose Corp., Maywood, Ill.
• Clayton & Lambert Mfg. Co., Middletown Div., Middletown, O.
Corbman Bros., Inc., Philadelphia, Pa.
Excelsior Steel Furnace Co., Chicago, Ill.
General Corporation, Minneapolis, Minn.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Gray Metal Products, Inc., Rochester, N. Y.
Henry Furnace Co., The, Medina, O.
Howes-Woods Co., Cambridge, Mass.
International Heater Co., Utica, N. Y.
Jacobs Co., B. & J., Cincinnati, O.
Littleford Bros., Inc., Cincinnati, O.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Wis.
Moncrief Furnace Co., Atlanta, Ga.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
Schecter Brothers Co., Philadelphia, Pa.
Sheet Metal Mfg. Co., Inc., Brooklyn, N. Y.
Sioux Steel Co., Sioux Falls, S. D.
Smith-Raymond Co., Columbus, Ga.
United States Register Co., Battle Creek, Mich.
Van Noorden Co., E., Boston, Mass.
Williamson Heater Co., Cincinnati, O.

DUCTS AND DUCT FITTINGS, PREFABRICATED, NON-METALLIC

Carey Mfg. Co., Philip, Cincinnati, O.
du Pont de Nemours & Co., E. I., Fabrics & Finishes Dept., Wilmington, Del.
Jacobs Co., B. & J., Cincinnati, O.
Knight, Maurice A., Akron, O. (acid fumes)
Smith-Raymond Co., Columbus, Ga.
Standard Furnace & Supply Co., Omaha, Neb.
United States Rubber Co., New York, N. Y.
Warner Bros. Co., Spiratube Div., Bridgeport, Conn.
Wiremold Co., The, Hartford, Conn.

DUST COLLECTORS

See Collectors, Dust

DUST COUNTERS

See Counters, Dust

ECONOMIZERS, FUEL

Babcock & Wilcox Co., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Combustion Engineering Co., Inc., New York, N. Y.
Doyle & Roth Mfg. Co., Newark, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Foster Wheeler Corp., New York, N. Y.
Fuel Savers, Inc., Harrisburg, Pa.
Green Fuel Economizer Co., Beacon, N. Y.
Richmond Engineering Co., Inc., Richmond, Va.
Springfield Boiler Co., Springfield, Ill.

EJECTORS, SEWAGE

American-Marsh Pumps, Inc., Battle Creek, Mich.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Works Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
Economy Pumps, Inc., Hamilton, O.
• Nash Engineering Co., South Norwalk, Conn.
Penberthy Injector Co., Detroit, Mich.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Inc., Buffalo, N. Y.
Weil Pump Co., Chicago, Ill.
Yeomans Bros. Co., Chicago, Ill.

ELBOWS, BALANCING, FOR HOT WATER HEATING SYSTEMS

Kehm Corp., The, Chicago, Ill.
Sarcotherm Controls, Inc., New York, N. Y.

ELECTRIC AIR CLEANERS

See Cleaners, Air, Electrical

ELECTRIC DRILLS

See Drills, Electric, Portable

ELECTRIC MOTORS

See Motors, Electric

ELECTRIC SHEARS

See Shears, Electric, Portable

ELECTRIC UNIT HEATERS

See Heaters, Unit, Electric Heating Element

ELECTRIC WATER HEATERS

See Heaters, Water, Electric

ELECTRODES, ARC WELDING

Air Reduction Sales Co., New York, N. Y.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Allied Weld-Craft, Inc., Indianapolis, Ind.
● Aluminum Co. of America, Pittsburgh, Pa.
American Agile Corp., Cleveland, O.
● American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Arcos Corp., Philadelphia, Pa.
Atlantic Steel Co., Atlanta, Ga.
Carlin Co., Anthony, Cleveland, O.
Chase Brass & Copper Co., Waterbury, Conn.
Electric Arc., Inc., Newark, N. J.
Eutectic Welding Alloys Corp., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
● Handy & Harman, New York, N. Y.
Harnischfeger Corp., Milwaukee, Wis.
Hobart Bros. Co., Troy, O.
Hollup Corp., Div. of National Cylinder Gas Co., Chicago, Ill.
International Nickel Co., Inc., The, New York, N. Y.
Jessop Steel Co., Washington, Pa.
Laclede Steel Co., St. Louis, Mo.
Lincoln Electric Co., Cleveland, O.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
McKay Co., Pittsburgh, Pa.
Metal & Thermit Corp., New York, N. Y.
National Carbon Co., New York, N. Y.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.
Sight Feed Generator Co., Richmond, Ind.
Smith Corp., A. O., Milwaukee, Wis.
Trindl Products, Ltd., Chicago, Ill.
Universal Power Corp., Cleveland, O.
Welding Apparatus Co., Chicago, Ill.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., New York, N. Y.

ELIMINATORS, AIR, FOR HEATING AND PIPING SYSTEMS

● Anderson Co., V. D., The, Cleveland, O.
● Armstrong Machine Works, Three Rivers, Mich.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
● Bell & Gossett Co., Morton Grove, Ill.
● Dole Valve Co., The, Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
● Hoffman Specialty Co., Indianapolis, Ind.
● Illinois Engineering Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati, O.
● Maid-O'-Mist, Inc., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Marsh Corp., Jas. P., Chicago, Ill.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., The, Cleveland, O.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
● Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sterling, Inc., Milwaukee, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Vapor Specialty Co., New York, N. Y.
Wright-Austin Co., Detroit, Mich.

ENAMELS AND LACQUERS

Acme White Lead & Color Works, Detroit, Mich.
Acorn Refining Co., Cleveland, O.
American-Marietta Co., Chicago, Ill.
Arco Co., Cleveland, O.
Baer Bros., New York, N. Y.
Blue Ridge Talc Co., Inc., Henry, Va.
Claronex Products, Inc., Brooklyn, N. Y.
Cordo Chemical Co., Norwalk, Conn.
Debevoise Co., The, Brooklyn, N. Y.
Detroit Graphite Co., Detroit, Mich.
Devoe & Raynolds Co., Inc., New York, N. Y.
du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Hague & Co., Alfred, Brooklyn, N. Y.
Hilo Varnish Corp., Brooklyn, N. Y.
Inter-Coastal Paint Corp., East St. Louis, Ill.
Irvington Varnish and Insulator Co., Irvington, N. J.
Knight, Maurice A., Akron, O.
Krehbiel Co., J. H., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
Midwest Products Co., Port Byron, Ill.
O'Brien Varnish Co., South Bend, Ind.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Quigley Co., Inc., New York, N. Y.
Roxalin Flexible Finishes, Inc., Elizabeth, N. J.
Sherwin-Williams Co., The, Cleveland, O.
Sonneborn Sons, Inc., L., New York, N. Y.
Thompson & Co., Pittsburgh, Pa.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit, Mich.
U. S. Gutta Percha Paint Co., Providence, R. I.
Wailes Dove-Hermiston Corp., Westfield, N. J.
Wattenamel Co., Summit, Ill.
Wilbur & Williams Co., Boston, Mass.
Wilhelm Co., A., Reading, Pa.
Zapon Div., Atlas Powder Co., North Chicago, Ill.

ENGINES, DIESEL, FOR FAN, PUMP AND COMPRESSOR DRIVES

American Locomotive Co., Auburn, N. Y.
Anderson Engine & Foundry Co., Anderson, Ind.
Baldwin De La Vergne Sales Corp., Philadelphia, Pa.
Bardco Mfg. & Sales Co., Los Angeles, Calif.
Buda Co., Harvey, Ill.
Caterpillar Tractor Co., Peoria, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Muskegon, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich.
Fairbanks, Morse & Co., Chicago, Ill.
Hill Diesel Engine Co., Lansing, Mich.
Ingersoll-Rand Co., New York, N. Y.
Waukesha Motor Co., Waukesha, Wis.
Witte Engine Works, Div. of Oil Well Supply Co., Kansas City, Mo.
● Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, GAS, FOR FAN, PUMP AND COMPRESSOR DRIVES

Bardco Mfg. & Sales Co., Los Angeles, Calif.
Buda Co., Harvey, Ill.
Caterpillar Tractor Co., Peoria, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Detroit, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., Chicago, Ill.
Ingersoll-Rand Co., New York, N. Y.
Salsbury Motors, Inc., Pomona, Calif.
Waukesha Motor Co., Waukesha, Wis.
Williamsport Engine & Machine Co., Williamsport, Pa.
Witte Engine Works, Div. of Oil Well Supply Co., Kansas City, Mo.
● Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, STEAM, FOR FAN, PUMP AND COMPRESSOR DRIVES

Ames Iron Wks., Div. of Pierce, Butler Radiator Corp., Oswego, N. Y.
Harrisburg Machinery Corp., Harrisburg, Pa.
Skinner Engine Co., Erie, Pa.
Troy Engine & Machine Co., Troy, Pa.
Vilter Mfg. Co., Milwaukee, Wis.

EQUIPMENT, BALANCING

● Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Gisholt Machine Co., Madison, Wis.

EVAPORATIVE CONDENSERS

See Condensers, Refrigerating, Evaporative

EXCHANGERS, HEAT

American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
Babcock & Wilcox Co., New York, N. Y.
● Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
Buffalo Tank Corp., Dunellen, N. J.
● Bush Mfg. Co., Hartford, Conn.
Champion Unit Heater Co., Chicago, Ill.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Foster Wheeler Corp., New York, N. Y.
Frank Heaters, Inc., Paterson, N. J.
Goodyear Industries, Inc., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Griscom-Russell Co., The, New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Kellogg Co., M. W., The, New York, N. Y.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
McQuay, Inc., Minneapolis, Minn.
Modine Mfg. Co., Racine, Wis.
• Mueller Brass Co., Port Huron, Mich.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Carbon Co., New York, N. Y.
National Pipe Bending Co., New Haven, Conn.
National Radiator Co., The, Johnstown, Pa.
Nooter Boiler Works, John, St. Louis, Mo.
Oiljack Mfg. Co., Inc., Montclaire, N. J.
• Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Phillips Cooling Tower Co., Inc., New York, N. Y.
Prat-Daniel Corp., Port Chester, N. Y.
• Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Quaker City Iron Works, Philadelphia, Pa.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
• Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Smith Corp., A. O., Milwaukee, Wis.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Stout & Sons, David, St. Louis, Mo.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Thermal Industries, Indio, Calif.
• Trane Co., The, LaCrosse, Wis.
United States Air Conditioning Corp., Minneapolis, Minn.
Vapor Car Heating Co., Inc., Chicago, Ill.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Whitlock Mfg. Co., Hartford, Conn.
Winslow Engineering Co., Oakland, Calif.
• Worthington Pump & Machinery Corp., Harrison, N. J.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

EXCHANGERS, HEAT, REFRIGERANT SUCTION LINE

• Acme Industries, Inc., Jackson, Mich.
Betz Corp., Hammond, Ind.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Brown Fintube Co., The, Elyria, O.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Flori Pipe Co., The, St. Louis, Mo.
Gerstein & Cooper Co., Smith Boston, Mass.
• Governair Corp., Oklahoma City, Okla.
Kaiser Co., E. B., Chicago, Ill.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
• Mueller Brass Co., Port Huron, Mich.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Standard Heater & Oil Equipment Co., Jersey, City, N. J.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Swan Engineering Co., Inc., Bloomfield, N. J.
Temprite Products Corp., Detroit, Mich.
Young Radiator Co., Racine, Wis.

EXHAUST HEADS

See Heads, Exhaust, for Pipe Lines

EXHAUSTERS, WELDING FUME

Aladdin Heating Corp., Oakland, Calif.
American Machine Products Co., Marshalltown, Ia.
Belanger Fan & Blower Co., Detroit, Mich.
Champion Blower & Forge Co., Lancaster, Pa.
• Chelsea Products, Inc., Irvington, N. J.
Chicago Pneumatic Tool Co., New York, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Day Co., The, Minneapolis, Minn.
Despatch Oven Co., Minneapolis, Minn.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
• General Blower Co., Morton Grove, Ill.
Kirk & Blum Mfg. Co., Cincinnati, O.
Klee Co., Geo., B., Cincinnati, O.
Power Engineering Co., Chicago, Ill.
Propellair, Inc., Springfield, O.
Ruemelin Mfg. Co., Milwaukee, Wis.
Torit Mfg. Co., St. Paul, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Whiting Corp., Harvey, Ill.
Wind-Way Fan & Ventilator Co., New Orleans, La.

EXPANDERS, BOILER TUBE

• Dudgeon, Inc., Richard, New York, N. Y.

EXPANSION BENDS

See Bends, Expansion

EXPANSION BOLTS

See Bolts, Expansion

EXPANSION JOINTS

See Joints, Pipe, Expansion

EXPANSION TANKS

See Tanks, Expansion, for Hot Water Heating Systems

EXPANSION VALVES

See Valves, Refrigeration

EXTRACTORS, PIPE

Kopperman & Sons, Joseph, Philadelphia, Pa.
Reps Tool Co., Inc., New York, N. Y.
• Ridge Tool Co., Elyria, O.

FABRICATED PIPING

See Bends; Headers; Joints, etc.

FABRICATORS, PIPE

See Headers, Welded; and Coils, Pipe

FAN BALANCING EQUIPMENT

See Equipment, Balancing

FAN BASES

See Bases and Pads, Vibration Isolating

FAN BLADES

See Blades, Propeller Fan

FAN HOUSINGS

See Housings, Fan, Centrifugal

FANS, AXIAL FLOW, PRESSURE TYPE

Bahnson Co., Winston-Salem, N. C.
• Buffalo Forge Co., Buffalo, N. Y.
Buffalo Turbine Corp., Buffalo, N. Y.
Caldwell Co., Wm. J., Washington, D. C.
• Chelsea Products, Inc., Irvington, N. J.
Circulators & Devices Mfg. Corp., New York, N. Y. (vaneaxial)
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Hartzell Propeller Fan Co., Piqua, O.
• Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind. (vaneaxial)
La-Del Div.—Joy Mfg. Co., New Philadelphia, O. (vaneaxial)
Moore Co., The, Kansas City, Mo. (vaneaxial)
Nationalaire Corp., Detroit, Mich.
Power Engineering Co., Chicago, Ill.
Propellair, Inc., Springfield, O.
• South Bend Air Products, Inc., South Bend, Ind.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass. (tubeaxial)
• Wing Mfg. Co., L. J., New York, N. Y.

FANS, CENTRIFUGAL

Advance Aluminum Castings Corp., Chicago, Ill.
Advance Fan & Blower Co., Detroit, Mich.
Air Control Products, Inc., Div. of Cleveland Heater Co., Coopersville, Mich.
Air Controls, Inc., Cleveland, O.
Aladdin Heating Corp., Oakland, Calif.
Allen Corp., Detroit, Mich.
American Blower Corp., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Furnace Co., St. Louis, Mo.
American Machine Products Co., Marshalltown, Ia.
Ballantyne Co., Omaha, Neb.
Bayley Blower Co., Milwaukee, Wis.
Beckett & Co., Thomas, Dallas, Tex.
Bern's Specialty Mfg. Co., Chicago, Ill.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
Brundage Co., The, Kalamazoo, Mich.
• Buffalo Forge Co., Buffalo, N. Y.
Caldwell Co., Wm. J., Washington, D. C.
Campbell Heating Co., Des Moines, Ia.
Campbell Heating Co., E. K., Kansas City, Mo.
• Carrier Corp., Syracuse, N. Y.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
• Chelsea Products, Inc., Irvington, N. J.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., New York, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Coppus Engineering Corp., Worcester, Mass.
Day Co., The, Minneapolis, Minn.
Despatch Oven Co., Minneapolis, Minn.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eastern Air Devices, Inc., Brooklyn, N. Y.
Eclipse Fuel Engineering Co., Rockford, Ill.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Electrovent Fan & Mfg. Co., Chicago, Ill.
Essick Mfg. Co., Los Angeles, Calif.
Garden City Fan Co., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
● General Blower Co., Morton Grove, Ill.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Grand Rapids Die & Tool Co., Grand Rapids, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
● Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Company, Indianapolis, Ind.
International Sales Co., San Francisco, Calif.
● Jackson & Church Co., Saginaw, Mich.
Jaden Mfg. Co., Hastings, Neb.
Jeffrey Mfg. Co., Columbus, O.
Johnson Fan & Blower Corp., Chicago, Ill.
King Co., The, Owatonna, Minn.
L-R Mfg. Co., Blower Div., Torrington, Conn.
● Lau Blower Co., Dayton, O.
Lehigh Fan & Blower Co., Allentown, Pa.
Leinweber Propellers, Chicago, Ill.
Magirl Foundry & Furnace Works, P. H., Bloomington, Ill.
Martin Fan & Blower Co., Chicago, Ill.
Master Fan Corp., Los Angeles, Calif.
Montag Stove & Furnace Wks., Portland, Ore.
Morrison Products, Inc., Cleveland, O.
Mountain States Equipment Co., Denver, Colo.
Mueller Furnace Co., L. J., Milwaukee, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
National Mfg. & Engineering Co., Detroit, Mich.
Nelson Corp., Herman, Moline, Ill.
New York Blower Co., Chicago, Ill.
Newcomb Engineering Co., Grand Rapids, Mich.
Niagara Blower Co., New York, N. Y.
Northern Blower Co., Cleveland, O.
Northwest Foundry & Furnace Co., Portland, Ore.
Palmer Mfg. Co., Phoenix, Ariz.
Peerless Electric Co., Warren, O.
Phelps Mfg. Co., Little Rock, Ark.
Power Engineering Co., Chicago, Ill.
Prat-Daniel Corp., Port Chester, N. Y.
Reynolds Mfg. Co., The, Grand Rapids, Mich.
Schwitzer-Cummins Co., Indianapolis, Ind.
Semco Mfg. Co., Nashville, Tenn.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
● Trane Co., The, La Crosse, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
● Wing Mfg. Co., L. J., New York, N. Y.

FANS, PROPELLER

Aerovent Fan Co., Piqua, O.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Aire-Foile Fan & Blower Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Allen Corp., Detroit, Mich.
American Blower Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
American Metal Products Co., Fort Worth, Tex.
Arex Co., Chicago, Ill.
Bahnson Co., Winston-Salem, N. C.
Bayley Blower Co., Milwaukee, Wis.
Beckett & Co., Thomas, Dallas, Tex.
Belanger Fan & Blower Co., Detroit, Mich.
Belco Exhaust Fan Mfg. Co., St. Louis, Mo.
Bern's Specialty Mfg. Co., Chicago, Ill.
● Bishop & Babcock Mfg. Co., Cleveland, O.
● Bronson Fan Mfg. Co., Los Angeles, Calif.
● Buffalo Forge Co., Buffalo, N. Y.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Caldwell Co., Wm. J., Washington, D. C.
Campbell Heating Co., E. K., Kansas City, Mo.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
● Chelsea Products, Inc., Irvington, N. J.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., New York, N. Y.
● Clarage Fan Co., Kalamazoo, Mich.
Coppus Engineering Corp., Worcester, Mass.
Dallas Engineering Co., Inc., Dallas, Tex.
De Bothezat Fans Div., American Machine & Metals, Inc., New York, N. Y.
Diehl Mfg. Co., Somerville, N. J.
Dual Air Fan Co., Chicago, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fresh'nd-Aire Co., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
● General Blower Co., Morton Grove, Ill.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Guth Co., Edwin F., St. Louis, Mo.
Hartzell Propeller Fan Co., Piqua, O.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
Holtum Mfg. Co., Freeport, Ill.
Howry-Berg Steel & Iron Works, Denver, Colo.
Hunter Fan & Ventilating Co., Inc., Memphis, Tenn.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
● Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Co., Indianapolis, Ind.
International Engineering, Inc., Dayton, O.
Jamieson Mfg. Co., Dallas, Tex.
Jeffrey Mfg. Co., Columbus, O.
Johnson Fan & Blower Corp., Chicago, Ill.
Johnston Co., William W., Dayton, O.
Jordan & Co., Paul R., Indianapolis, Ind.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Klee Co., Geo. B., Cincinnati, O.
● La-Del Div.—Joy Mfg. Co., New Philadelphia, O.
● Lau Blower Co., Dayton, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Martin Fan & Blower Co., Chicago, Ill.
● McCord Corp., Detroit, Mich.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Moore Co., The, Kansas City, Mo.
Mountain States Equipment Co., Denver, Colo.
Myers Electric Co., Inc., Pittsburgh, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
Nationalaire Corp., Detroit, Mich.
Nelson Corp., Herman, Moline, Ill.
New York Blower Co., Chicago, Ill.
Newcomb Engineering Co., Grand Rapids, Mich.
Peerless Electric Co., Warren, O. (Disc)
Perkins & Son, Inc., B. F., Holyoke, Mass.
Phelps Mfg. Co., Little Rock, Ark.
Pritchard & Co., J. F., Kansas City, Mo.
Propellair, Inc., Springfield, O.
Reed Unit-Fans, Inc., New Orleans, La.
Reynolds Electric Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Semco Mfg. Co., Nashville, Tenn.
Shreveport Engineering Co., Inc., Shreveport, La.
Signal Electric Mfg. Co., Menominee, Mich.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Smith Mfg. Co., F. A., Rochester, N. Y.
Somers, Inc., H. J., Detroit, Mich.
● South Bend Air Products, Inc., South Bend, Ind.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Sutton Corp., O. A., Wichita, Kan.
Swift Mfg. Co., Inc., Detroit, Mich.
Thermal Industries, Indio, Calif.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
● Trane Co., The, La Crosse, Wis.
Truflo Fan Co., Harmony, Pa.
● United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Victor Electric Products, Inc., Cincinnati, O.
Viking Air Conditioning Corp., Cleveland, O.
Water Cooling Equipment Corp., St. Louis, Mo.
Western Blower Co., Seattle, Wash.
Western Engineering & Mfg. Co., Los Angeles, Calif.
Wind-Way Fan & Ventilator Co., New Orleans, La.
● Wing Mfg. Co., L. J., New York, N. Y.

FEEDERS, CHEMICAL, PROPORTIONING

American Water Softener Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Elgin Softener Corp., Elgin, Ill.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Haering & Co., Inc., D. W., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
% Proportioneers, Inc. %, Providence, R. I.
Permutit Co., New York, N. Y.
Roy Co., Milton, Philadelphia, Pa.
Sprout, Waldron & Co., Muncy, Pa.
● Stephens-Adamson Mfg. Co., Aurora, Ill.
Syntron Co., Homer City, Pa.
Wade Mfg. Co., Elgin, Ill.
Wallace & Tiernan Co., Inc., Newark, N. J.

FEEDERS, WATER, HEATING BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Cissell Mfg. Co., W. M., Louisville, Ky.
Davis Regulator Co., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
● General Controls Co., Glendale, Cal.
Jacuzzi Bros., Inc., Richmond, Calif.
● Johnson Corp., Three Rivers, Mich.
● Kieley & Mueller, Inc., North Bergen, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
● Maid-O'-Mist, Inc., Chicago, Ill.
● McAlear Mfg., Div. of Climax Industries, Inc., Chicago, Ill.
● McDonnell & Miller, Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nason Co., Detroit, Mich.

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● Schaub Engineering Co., Fred H., Chicago, Ill.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Templeton Mfg. Co., Hyde Park, Mass.
Watts Regulator Co., Lawrence, Mass.
● Webster & Co., Warren, Camden, N. J.

FEEDWATER HEATERS

See Deaerators

FIBER PACKING

See Packing, Fiber

FIBER PIPE

See Pipe, Fiber

FILTER GAGES

See Gages, Air Filter

FILTERS, AIR, AUTOMATIC

● Air & Refrigeration Corp., New York, N. Y.
Air-Stream Filter Corp., St. Louis, Mo.
● American Air Filter Co., Inc., Louisville, Ky.
Brauer Supply Co., A. G., St. Louis, Mo.
Continental Air Filters, Inc., Louisville, Ky.
Dollinger Corp., Rochester, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.

FILTERS, AIR, UNIT, CLEANABLE

● Air Devices, Inc., New York, N. Y.
Air Filter Corp., Milwaukee, Wis.
Air Filter Engineering Co., Chicago, Ill.
Air-Maze Corp., Cleveland, O.
Air-Stream Filter Corp., St. Louis, Mo.
● American Air Filter Co., Inc., Louisville, Ky.
● Annis Air Filters, Glendale, Calif.
Brauer Supply Co., A. G., St. Louis, Mo.
Chicago Filter Co., Joliet, Ill.
Continental Air Filters, Inc., Louisville, Ky.
Coppus Engineering Corp., Worcester, Mass.
Dollinger Corp., Rochester, N. Y.
Drico Industrial Corp., New York, N. Y.
Farr Co., Los Angeles, Calif.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kaye & MacDonald, Inc., West Orange, N. J.
Morf Industries, Inc., Staten Island, N. Y.
Nationalaire Corp., Detroit, Mich.
● Research Products Corp., Madison, Wis.
Somers, Inc., H. J., Detroit, Mich.
Supreme Air Filter Co., New York, N. Y.
Universal Air Filter Corp., Duluth, Minn.

FILTERS, AIR, UNIT, THROW-AWAY

● American Air Filter Co., Inc., Louisville, Ky.
Andale Co., Philadelphia, Pa.
Arcweld Mfg. Co., Inc., Seattle, Wash.
Beckett & Co., Thomas, Dallas, Tex.
Blocksom & Co., Michigan City, Ind.
Chicago Filter Co., Joliet, Ill.
Drico Industrial Corp., New York, N. Y.
General Filters, Inc., Detroit, Mich. (For fuel oil)
Morf Industries, Inc., Staten Island, N. Y.
● Owens-Corning Fiberglas Corp., Toledo, O.
● Research Products Corp., Madison, Wis.
Universal Air Filter Corp., Duluth, Minn.
● Wilson & Co., Inc., Chicago, Ill.

FILTERS, ODOR

See Adsorbers, Odor

FILTERS, PIPE LINE

Adams Co., Inc., R. P., Buffalo, N. Y.
Air-Maze Corp., Cleveland, O.
● Alco Valve Co., St. Louis, Mo.
● American Air Filter Co., Inc., Louisville, Ky.
American Cyanamid & Chemical Corp., New York, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
Annis Air Filters, Glendale, Calif.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cleveland Humidifier Co., Cleveland, O.
Commercial Filters Corp., Boston, Mass.
Cuno Engineering Corp., Meriden, Conn.
Dollinger Corp., Rochester, N. Y.
Drico Industrial Corp., New York, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
● Fisher Governor Co., Marshalltown, Ia.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Hotstream Heater Co., Cleveland, O. (air)
● Johnson Corp., Three Rivers, Mich.
Kraissl Co., Inc., The, Hackensack, N. J.
Logan Engineering Co., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
Moraine Products Div., General Motors Corp., Dayton, O.
Morse-Smith-Morse, Inc., Watertown, Mass.
Newark Wire Cloth Co., Newark, N. J.
Norgren Co., C. A., Denver, Colo.
Patrol Valve Co., The Cleveland, O.
Permutit Co., New York, N. Y.
Refinite Corp., Omaha, Neb.
Rega Mfg. Co., Rochester, N. Y.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Scientific Instrument Co., Detroit, Mich.
Trerice Co., Detroit, Mich.
Weatherhead Co., Cleveland, O.
Winslow Engineering Co., Oakland, Calif.
● Worthington Pump & Machinery Corp., Harrison, N. J.

FILTERS, REFRIGERANT

● Alco Valve Co., St. Louis, Mo.
● Automatic Products Co., Milwaukee, Wis.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Commercial Filters Corp., Boston, Mass.
Drico Industrial Corp., New York, N. Y.
● Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Moraine Products Div., General Motors Corp., Dayton, O.
● Mueller Brass Co., Port Huron, Mich.
Newark Wire Cloth Co., Newark, N. J.
Phillips & Co., H. A., Chicago, Ill.
Sporlan Valve Co., St. Louis, Mo.

FILTERS, WATER

Adams Co., Inc., R. P., Buffalo, N. Y.
● Alco Valve Co., St. Louis, Mo.
American Cyanamid & Chemical Corp., New York, N. Y.
American Water Softener Co., Philadelphia, Pa.
Aqua-Mist Co., Topeka, Kan. (Aspenwood fibre)
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cochrane Corp., Philadelphia, Pa.
Commercial Filters Corp., Boston, Mass.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cuno Engineering Corp., Meriden, Conn.
Dollinger Corp., Rochester, N. Y.
Drico Industrial Corp., New York, N. Y.
Elgin Softener Corp., Elgin, Ill.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Liquid Conditioning Corp., New York, N. Y.
Newark Wire Cloth Co., Newark, N. J.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Refinite Corp., Omaha, Neb.
Winslow Engineering Co., Oakland, Calif.
● Worthington Pump & Machinery Corp., Harrison, N. J.

FINNED TUBING

See Tubing, Finned

FIRE PUMPS

See Pumps, Fire

FITTINGS, BLOW PIPE

Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Allington & Curtis Mfg. Co., Saginaw, Mich.
Chicago Metal Mfg. Co., Chicago, Ill.
Day Co., The, Minneapolis, Minn.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mahon Co., R. C., Detroit, Mich.
National Metal Fabricators, Chicago, Ill.
Newcomb Engineering Co., Grand Rapids, Mich.
Northern Blower Co., Cleveland, O.
Peters-Dalton, Inc., Detroit, Mich.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Schmieg Industries, Detroit, Mich.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Tiffin Eaves Trough Clamp Co., Tiffin, O.
United States Register Co., Battle Creek, Mich.
Western Blower Co., Seattle, Wash.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

FITTINGS, COPPER TUBE, COMPRESSION

● American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Dole Valve Co., The, Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Everhot Products Co., Chicago, Ill.
● Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Packless Metal Products Corp., New Rochelle, N. Y. (Self-flaring)
Parker Appliance Co., The, Cleveland, O.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, FLARED

● American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Commonwealth Brass Corp., Detroit, Mich.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Dole Valve Co., The, Chicago, Ill.
Everhot Products Co., Chicago, Ill.
• Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
• Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Packless Metal Products Corp., New Rochelle, N. Y.
Parker Appliance Co., The, Cleveland, O.
Phoenix Brass Fittings Corp., Irvington, N. J.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, SOLDER

Acheson Mfg. Co., Rankin, Pa.
• American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Grabler Mfg. Co., Cleveland, O.
• Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Phoenix Brass Fittings Corp., Irvington, N. J.
Union Metal Works, Chelsea, Mass.
• Walworth Co., New York, N. Y. (Brazed)

FITTINGS, DRAINAGE, FIXED AIR BREAK

American Sterilizer Co., Erie, Pa.
• Crane Co., Chicago, Ill.
Scanlan-Morris Co., Madison, Wis.
Semler Co., Jeannette, Pa.
Wade Mfg. Co., Elgin, Ill.

FITTINGS, HOT WATER HEATING SYSTEMS, ONE PIPE

• Bell & Gossett Co., Morton Grove, Ill.
Kehm Corp., The, Chicago, Ill.
Semler Co., Jeannette, Pa.
Taco Heaters, Inc., New York, N. Y.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
• Tube Turns, Inc., Louisville, Ky.

FITTINGS, LINED

American Hard Rubber Co., New York, N. Y. (Rubber)
Cement Lined Pipe Co., Lynn, Mass.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O. (Rubber)
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin)
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Michigan Pipe Co., Bay City, Mich.
National Lead Co., New York, N. Y. (Lead)
Northern Indiana Brass Co., Elkhart, Ind. (Tinned)
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass.
United States Rubber Co., New York, N. Y. (Rubber)

FITTINGS, PIPE, BRASS, SOLDER

Acheson Mfg. Co., Rankin, Pa.
• American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., Cleveland, O.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Crane Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Keeney Mfg. Co., Newington, Conn.
• Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Parker Appliance Co., Cleveland, O.
Union Metal Works, Chelsea, Mass.
• Walworth Co., New York, N. Y. (Brazed)

FITTINGS, PIPE BRASS, THREADED

Acheson Mfg. Co., Rankin, Pa.
American Manganese Bronze Co., Philadelphia, Pa.
Bowser, Inc., Fort Wayne, Ind.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
Leavitt Machine Co., Orange, Mass.
Lunkenheimer Co., Cincinnati, O.
New York Brass Fdry., New York, N. Y.
Parker Appliance Co., Cleveland, O.
Penn Mfg. Corp., of Washington, Pa., Washington, Pa.
Phoenix Brass Fittings Corp., Irvington, N. J.
Ross Sprinkler Co., Pasadena, Calif.
Union Metal Wks., Chelsea, Mass.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, BRASS, WELDING

Bonney Forge & Tool Wks., Allentown, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
• Midwest Piping & Supply Co., Inc., St. Louis, Mo.
• Tube Turns, Inc., Louisville, Ky.
• Walworth Co., New York, N. Y. (Brazed)

FITTINGS, PIPE, BRONZE, BRAZED

Chase Brass & Copper Co., Waterbury, Conn.
• Crane Co., Chicago, Ill.
Fairbanks Co., New York, N. Y.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Kaltenthaler Co., H. J., Philadelphia, Pa.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Union Metal Works, Chelsea, Mass.
• Walworth Co., New York, N. Y.

FITTINGS, PIPE, CAST IRON, FLANGED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Central Foundry Co., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
• Crane Co., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eastern Foundry Co., Boyertown, Pa.
Frick Co., Waynesboro, Pa.
• Grinnell Co., Inc., Providence, R. I.
Jarecki Mfg. Co., Erie, Pa.
Kaltenthaler Co., H. J., Philadelphia, Pa.
• Kennedy Valve Mfg. Co., The, Elmira, N. Y.
• Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
Malleable Iron Fittings Co., Branford, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semler Co., Jeannette, Pa.
Stockham Pipe Fittings Co., Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., The Syracuse, N. Y.
United States Pipe & Foundry Co., Burlington, N. J.
• Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.

FITTINGS, PIPE, CAST IRON, THREADED

Central Foundry Co., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
• Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Eastern Foundry Co., Boyertown, Pa.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Frick Co., Waynesboro, Pa.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Kuhns Bros. Co., Dayton, O.
Malleable Iron Fittings Co., Branford, Conn.
Ravena Iron Co., Ravena, N. Y.
Semler Co., Jeannette, Pa.
Somerville Iron Works, Somerville, N. J.
Stockham Pipe Fittings Co., Birmingham, Ala.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, COMPRESSION

• Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Hays Mfg. Co., Erie, Pa.
Patrol Valve Co., The, Cleveland, O.

FITTINGS, PIPE, HARD RUBBER

American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
United States Rubber Co., New York, N. Y.

FITTINGS, PIPE, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Patrol Valve Co., The, Cleveland, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Works, Inc., Rochester, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

FITTINGS, PIPE, MALLEABLE

• Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
Malleable Iron Fittings Co., Branford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Rhode Island Fittings Co., Hillsgrove, R. I.
Stockham Pipe Fittings Co., Birmingham, Ala.
Victaulic Co. of America, New York, N. Y.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, NICKEL AND NICKEL ALLOY

Alloy Steel Products Co., Linden, N. J.
American Manganese Bronze Co., Philadelphia, Pa.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Hasco Valve & Machine Co., Milwaukee, Wis.
International Nickel Co., New York, N. Y.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
• Tube Turns, Inc., Louisville, Ky.
Warren Foundry & Pipe Corp., New York, N. Y.

FITTINGS, PIPE, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
Amerform Corp., Philadelphia, Pa.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
Parker Appliance Co., The, Cleveland, O.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

FITTINGS, PIPE, STEEL, FLANGED

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Frick Co., Waynesboro, Pa.
Hamer Oil Tool Co., Long Beach, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Kerotest Mfg. Co., Pittsburgh, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
National Valve & Mfg. Co., Pittsburgh, Pa.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Semet-Solvay Engrg. Corp., New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, FORGED, THREADED

Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
• Crane Co., Chicago, Ill.
• Henry Valve Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, SOCKET WELD

Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
• Crane Co., Chicago, Ill.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, THREADED

Alloy Steel Products Co., Linden, N. J., (Stainless steel)
Catawissa Valve & Fittings Co., Catawissa, Pa.
Colonial Alloys Co., Metals, Div., Philadelphia, Pa. (Stainless)
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Penn Mfg. Corp. of Washington, Pa, Washington, Pa.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Tubing Seal-Cap, Inc., Los Angeles, Calif.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.
Wedge Protectors, Inc., Cleveland, O.

FITTINGS, PIPE, STEEL, WELDING

Alloy Steel Products Co., Linden, N. J.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Bonney Forge & Tool Wks., Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
• Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
• Globe Steel Tubes Co., Milwaukee, Wis.
• Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
• Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Oil Well Supply Co., Oil City, Pa.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
• Taylor Forge & Pipe Wks., Chicago, Ill.
• Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.
Wedge Protectors, Inc., Cleveland, O. (Chill rings)

FITTINGS, PIPE, WROUGHT IRON, WELDING

Bonney Forge & Tool Wks., Allentown, Pa.
• Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
• Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
• Taylor Forge & Pipe Wks., Chicago, Ill.
• Tube Turns, Inc., Louisville, Ky.

FITTINGS, REFRIGERATION

Aeroquip Corp., Jackson, Mich.
American Injector Co., Detroit, Mich.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Byers Co., A. M., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
• Crane Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Electrimatic, Chicago, Ill.
Frick Co., Waynesboro, Pa.
Hays Mfg. Co., Erie, Pa.
• Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
• Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Parker Appliance Co., Cleveland, O.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co. Roselle, N. J.
Weatherhead Co., Cleveland, O.
Wittenmeier Machinery Co., Chicago, Ill.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Inc., Chicago, Ill.
York Corp., York, Pa.

FITTINGS, STEEL TUBE, FLARED

• Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.

FLAME CONTROLS

See Controls, Flame Failure

FLANGE BOLTS

See Bolts and Studs, Flange

FLANGES, ORIFICE

Barton Instrument Co., Los Angeles, Calif.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Conoflow Corp., Philadelphia, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Meriam Instrument Co., The, Cleveland, O.
Phoenix Mfg. Co., Joliet, Ill.
Trimount Instrument Co., Chicago, Ill.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

FLANGES, PIPE, ALLOY STEEL, LAP JOINT

Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, SCREWED

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, WELDING

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, BRASS, SCREWED

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Conoflow Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
● Grinnell Co., Inc., Providence, R. I.
Jarecki Mfg. Co., Erie, Pa.
Kaltenthaler Co., H. J., Philadelphia, Pa.
Kopperman & Sons, Joseph, Philadelphia, Pa.
National Valve & Mfg. Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Union Metal Works, Chelsea, Mass.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, CAST IRON, SCREWED

Clow & Sons, James B., Chicago, Ill.
● Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
● Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Kaltenthaler Co., H. J., Philadelphia, Pa.
● Kennedy Valve Mfg. Co., The, Elmira, N. Y.
● Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Ravena Iron Co., Ravena, N. Y.
Semler Co., Jeannette, Pa.
Stockham Pipe Fittings Co., Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., Syracuse, N. Y.
● Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Warren Foundry & Pipe Corp., New York, N. Y.

FLANGES, PIPE, MALLEABLE IRON, SCREWED

● Baker Ice Machine Co., Inc., Omaha, Neb.
● Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
● Grinnell Co., Inc., Providence, R. I.
National Valve & Mfg. Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Rhode Island Fittings Co., Hillsgrove, R. I.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., Hillside, N. J.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
Phoenix Mfg. Co., Joliet, Ill.

FLANGES, PIPE, STEEL, LAP JOINT

Alloy Steel Products Co., Linden, N. J.
● Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Chicago Metal Mfg. Co., Chicago, Ill.
● Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, STEEL, SCREWED

Alloy Steel Products Co., Linden, N. J.
● Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
● Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.

FLANGES, PIPE, STEEL, WELDING

Alloy Steel Products Co., Linden, N. J.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
● Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
● Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Ladish Drop Forge Co., Fittings Div., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
● Naylor Pipe Co., Chicago, Ill.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
● Taylor Forge & Pipe Works, Chicago, Ill.
● Tube Turns, Inc., Louisville, Ky.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.

FLARED FITTINGS, COPPER TUBE

See Fittings, Copper Tube, Flared

FLARED FITTINGS, STEEL TUBE

See Fittings, Steel Tube, Flared

FLARING TOOLS FOR TUBING

See Tools, Flaring

FLEXIBLE COUPLINGS

See Couplings, Flexible

FLEXIBLE DUCT CONNECTIONS

See Connections, Duct, Flexible

FLEXIBLE METAL HOSE

See Hose, Metal and Fittings

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

FLOAT SWITCHES

See Switches, Float

FLOAT VALVES

See Valves, Float

FLOATS, STEAM TRAP, ETC.

Bailey Co., Chas. M., San Francisco, Calif.
Clark Controller Co., Cleveland, O.
• Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Harris & Co., Arthur, Chicago, Ill.
Hercules Float Wks., Springfield, Mass.
• Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
• Kieley & Mueller, Inc., North Bergen, N. J.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• Milwaukee Valve Co., Milwaukee, Wis.
Naugatuck Mfg. Co., Union City, Conn.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Reichert Float & Mfg. Co., Toledo, O.
Reliance Gauge Column Co., Cleveland, O.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Swartwout Co., Cleveland, O.
Templeton Mfg. Co., Hyde Park, Mass.
• Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
Williams Gauge Co., Pittsburgh, Pa.

FLOOR AND CEILING PLATES

See Plates, Floor and Ceiling

FLOW CONTROL VALVES

See Valves, Flow Control

FLOW METERS

See Meters, Flow

FLOW SWITCHES

See Switches, Flow

FORGED STEEL VALVES

See Valves, Forged Steel

FRESHENERS, AIR

See Adsorbers, Odor; Compounds, Air Freshening

FUEL ECONOMIZERS

See Economizers, Fuel

FURNACES, WARM AIR, FOR INDUSTRIAL AND LARGE BUILDING HEATING

• Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
American Furnace Co., St. Louis, Mo.
Arcweld Mfg. Co., Inc., Seattle, Wash.
Beck Engineering Combustion Kompany, St. Louis, Mo.
Bryant Heater Co., The, Cleveland, O.
• Campbell Heating Co., Des Moines, Ia.
Campbell Heating Co., E. K., Kansas City, Mo.
Certified Furnace Co., Div. of Stainless & Steel Products Co., St. Paul, Minn.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Demuth & Sons, Charles, Mineola, L. I., N. Y.
• Dravo Corp., Pittsburgh, Pa.
Grossenbacher Furnace Co., Overland, Mo.
International Sales Co., San Francisco, Calif.
• Jackson & Church Co., Saginaw, Mich.
Lee Engineering Co., Youngstown, O.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y. and Columbus, O.
Magirl Foundry & Furnace Wks., P. H., Bloomington, Ill.
Majestic Co., Huntington, Ind.
Mayflower Air-Conditioners, Inc., St. Paul, Minn.
McCann Furnace Co., Cleveland, O.
McPherson Furnace & Supply Co., Portland, Ore.
Meyer Furnace Co., The, Peoria, Ill.
Moncrief Furnace Co., Atlanta, Ga.
Montag Stove & Furnace Wks., Portland, Ore.
Mueller Furnace Co., L. J., Milwaukee, Wis.
National Heater Co., Minneapolis, Minn.
National Mfg. & Engineering Co., Detroit, Mich.
Northwest Foundry & Furnace Co., Portland, Ore.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace Co., Beverly Hills, Calif.
Rosebraugh Co., W. W., Salem, Ore.
Smith Heater Co., Peter, Dearborn, Mich.
Surface Combustion Corp., Toledo, O.
Syncromatic Corp., Watertown, Wis.
XXth Century Heating & Ventilating Co., Akron, O.
United States Radiator Corp., Detroit, Mich.

FUSIBLE LINKS

See Links, Fusible

GAGE GLASSES

See Glasses, Gage

GAGE TESTERS

See Testers, Gage, Dead Weight

GAGES, AIR FILTER

Air Filter Engineering Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Hays Corp., Michigan City, Ind.
Herbusch Corp., The, St. Louis, Mo. (Warning device)
Hill, E. Vernon, Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cole-Sewell Engineering Co., St. Paul, Minn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W. Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Hill, E. Vernon, Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, PRESSURE

Ashton Valve Co., Cambridge, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Belfield Co., H., Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Wks., Detroit, Mich.
• Dole Valve Co., The, Chicago, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Foxboro Co., Foxboro, Mass.
• Gotham Instrument Co., Inc., New York, N. Y.
Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
Hill, E. Vernon, Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
• Kieley & Mueller, Inc., North Bergen, N. J.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Mouat Vapor Heating Co., The, Cleveland, O.
Norgren Co., C. A., Denver, Colo.
Perfex Corp., Milwaukee, Wis.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., Chicago, Ill.
• Taylor Instrument Companies, Rochester, N. Y.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

GAGES, INDICATING, VACUUM

Ashton Valve Co., Cambridge, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.

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Bailey Meter Co., Cleveland, O.
Belfield Co., H., Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Davis Emergency Equipment Co., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
● Dole Valve Co., The, Chicago, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Foxboro Co., Foxboro, Mass.
● Gotham Instrument Co., Inc., New York, N. Y.
Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Mouat Vapor Heating Co., The, Cleveland, O.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., Chicago, Ill.
Stokes Machine Co., F. J., Philadelphia, Pa.
● Taylor Instrument Companies, Rochester, N. Y.
● Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Wallace & Tiernan, Inc., Newark, N. J.
Weksler Thermometer Corp., New York, N. Y.

GAGES, LIQUID LEVEL

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Injector Co., Detroit, Mich.
Applied Mechanics Co., Boston, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Barton Instrument Co., Los Angeles, Calif.
Bearlee Products Co., Green Bay, Wis.
Bordo Co., Inc., L. J., Glenside, Pa.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Caldwell Co., W. E., Louisville, Ky.
Defender Instrument and Regulator Co., St. Louis, Mo.
Diamond Power Specialty Corp., Detroit, Mich.
Foxboro Co., Foxboro, Mass.
Frick Co., Waynesboro, Pa.
Hays Corp., Michigan City, Ind.
● Henry Valve Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
King Engineering Corp., Ann Arbor, Mich.
King Gauge & Mfg. Co., New Haven, Conn.
Klingerit, Inc., New York, N. Y.
● Krueger Sentry Gauge Co., Green Bay, Wis.
Liquidometer Corp., Long Island City, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Mel-Gauge Co., East Haven, Conn.
Meriam Instrument Co., The, Cleveland, O.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
Moore Products Co., Philadelphia, Pa.
Morse-Smith-Morse, Inc., Watertown, Mass.
Nason Co., Detroit, Mich.
Penberthy Injector Co., Detroit, Mich.
Petrometer Corp., Long Island City, N. Y.
Powell Co., Wm., Cincinnati, O.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Reliance Gauge Column Co., Cleveland, O.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Scully Signal Co., Cambridge, Mass.
Stewart-Warner Corp., Chicago, Ill.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Techtmann Industries, Inc., Milwaukee, Wis.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Viking Pump Co., Cedar Falls, Ia.
Wallace & Tiernan Co., Newark, N. J.
Williams Gauge Co., Pittsburgh, Pa. (Water)
Wright-Austin Co., Detroit, Mich.
● Yarnall-Waring Co., Philadelphia, Pa.

GALVANIZED SHEETS

See Sheets, Steel, Galvanized

GALVANNEALED SHEETS

See Sheets, Steel, Galvannealed

GAS BURNERS

See Burners, Gas

GAS ENGINES

See Engines, Gas

GAS FIRED RADIATORS

See Radiators, Gas Fired

GAS PRESSURE REGULATORS

See Regulators, Pressure, Gas

GAS VOLUME METERS

See Meters, Volume, Air and Gas

GASKETS

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill. (Felt, rubber)
Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Akron Metallic Gasket Co., Akron, O. (Metal & metal asbestos)
Alpha Metals, Inc., Brooklyn, N. Y.
Anchor Packing Co., Philadelphia, Pa. (Asbestos)
Armstrong Cork Co., Lancaster, Pa. (Cork & cork composition)
Azor Corp., Irvington, N. J. (Spiral wound)
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y. (Lead)
Chase Brass & Copper Co., Waterbury, Conn. (Brass)
Chicago-Wilcox Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Del.
Continental Rubber Wks., Erie, Pa.
● Crane Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y. (Asbestos)
Durabla Mfg. Co., New York, N. Y. (Asbestos fibre)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa. (Paper, fibre)
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill. (Heat and oil resisting)
Felters Company, The, Boston, Mass.
Flexitallic Gasket Co., Camden, N. J. (Metal, asbestos)
Flexlock Corp., Akron, O.
Frick Co., Waynesboro, Pa.
Garlock Packing Co., Palmyra, N. Y. (Rubber, asbestos, fibre, semi-metallic)
Gates Rubber Co., The, Denver, Colo.
Gatke Corp., Chicago, Ill.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Goodrich Co., B. F., Akron, O.
● Grant Wilson, Inc., Chicago, Ill. (Asbestos)
Graton & Knight Co., Worcester, Mass. (Leather)
Greene, Tweed & Co., New York, N. Y.
Houghton & Co., E. F., Philadelphia, Pa. (Leather)
Johns-Manville, New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa. (Asbestos)
Klingerit, Inc., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J. (Metal, metal asbestos)
Mitchell & Smith, Inc., Detroit, Mich. (Cork)
Mortell Co., J. W., Kankakee, Ill.
National Engineering Products, Inc., Washington, D. C. (Plastic)
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. (Rubber and asbestos)
Resistoflex Corp., Belleville, N. J.
Ruberoid Co., New York, N. Y. (Asbestos)
Schieren Co., Chas. A., New York, N. Y.
Sherwin-Williams Co., The, Cleveland, O.
Smooth-On Mfg. Co., Jersey City, N. J. (Corrugated iron)
Steel Improvement & Forge Co., Cleveland, O.
Stokes Molded Products, Trenton, N. J. (Hard rubber)
Technical Ply-Woods, Chicago, Ill.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Gasket Co., Camden, N. J.
United States Rubber Co., New York, N. Y. (Rubber, asbestos)
United States Stoneware Co., New York, N. Y.
Vibration Engineering Co., The, New York, N. Y. (Cork)
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Western Felt Wks., Chicago, Ill. (Felt)
● Wilson, Inc., Grant, Chicago, Ill. (Asbestos)

GASOLINE FIRED HEATERS

See Heaters, Gasoline Fired

GATE VALVES

See Valves, Gate

● Advertisement in this issue. **See Index to Advertisers, pages 343-344.**

GATES, BLAST

Allington & Curtis Mfg. Co., Saginaw, Mich.
Berger Bros., Co., Philadelphia, Pa.
Blower Application Co., Milwaukee, Wis.
• Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
• Clarage Fan Co., Kalamazoo, Mich.
Day Co., The, Minneapolis, Minn.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Maysteel Products, Inc., Milwaukee, Wis.
Newcomb Engineering Co., Grand Rapids, Mich.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
R-S Products Corp., Philadelphia, Pa.
Spencer Turbine Co., Hartford, Conn.
Thermix Engineering Co., Greenwich, Conn.
Western Blower Co., Seattle, Wash.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.

GLASS, HEAT ABSORBING

See Windows, Heat Insulating

GLASS PIPE

See Pipe, Glass

GLASSES, GAGE

Bache, Semon & Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
• Crane Co., Chicago, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Fischer & Porter Co., Hatboro, Pa.
• Henry Valve Co., Chicago, Ill.
Klingerit, Inc., New York, N. Y.
Libbey-Owens-Ford Glass Co., Toledo, O.
Lunkenheimer Co., Cincinnati, O.
Powell Co., Wm., Cincinnati, O.
Semon Bache & Co., New York, N. Y.
Swift Lubricator Co., Elmira, N. Y.

GLASSES, SIGHT, FOR PIPE LINES

American District Steam Co., North Tonawanda, N. Y.
Bowser, Inc., Fort Wayne, Ind.
Cochrane Corp., Philadelphia, Pa.
Corning Glass Works, Corning, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Libbey-Owens-Ford Glass Co., Toledo, O.
Mueller Brass Co., Port Huron, Mich.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Weatherhead Co., Cleveland, O.

GLOBE VALVES

See Valves, Globe

GOVERNORS, PUMP

Atlas Valve Co., Inc., Newark, N. J.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A., York, Pa.
Cash Co., A. W., Decatur, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Etse Div., American Chain & Cable Co., Inc., Reading, Pa.
• Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Gardner-Denver Co., Quincy, Ill.
• Hagan Corp., Pittsburgh, Pa.
Keckley Co., O. C., Chicago, Ill.
• Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• McDonnell & Miller, Inc., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Co., Erie, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Sampsel Time Control, Inc., Spring Valley, Ill.
Schade Valve Mfg. Co., Philadelphia, Pa.
Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Swartwout Co., Cleveland, O.
Watson & McDaniel Co., Philadelphia, Pa.
• Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., Pittsburgh, Pa.

GRILLES

See also Diffusers; Panels, Perforated, for Air Diffusion; Registers

A-J Mfg. Co., Kansas City, Mo.
Acme Mfg. Co., Philadelphia, Pa.
Air Control Products, Inc., Coopersville, Mich.
• Air Devices, Inc., New York, N. Y.
AirO-Fin Register Co., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
• Auer Register Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Beckley Perforating Co., Garwood, N. J.
Best Register Co., Milwaukee, Wis.
Central Wire & Iron Works, Des Moines, Ia.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Crown Iron Works, Minneapolis, Minn.
Decatur Iron & Steel Co., Decatur, Ala.
Diamond Mfg. Co., Wyoming, Pa.
Eaglesfield Ventilator Co., Indianapolis, Ind. (wood)
Empire Ventilation Equipment Co., Long Island City, N. Y.
Erdle Perforating Co., Rochester, N. Y.
Gilliam Mfg. Co., Detroit, Mich.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
Hendrick Mfg. Co., Carbondale, Pa.
Independent Register Co., Cleveland, O.
Jamieson Mfg. Co., Dallas, Tex.
Johnston & Chapman Co., Chicago, Ill.
Lockjoint Wood Products Co., Wichita, Kans. (Wood)
Manhattan Perforated Metal Co., Inc., Long Island City, N. Y.
Middleton Mfg. & Sales Co., Minneapolis, Minn.
• Mueller Furnace Co., L. J., Milwaukee, Wis.
Mundt & Sons, Charles, Jersey City, N. J.
Newman Brothers, Inc., Cincinnati, O.
Register & Grille Mfg. Co., Brooklyn, N. Y.
Reliable Perforating Co., Chicago, Ill.
Rock Island Register Co., Rock Island, Ill.
Schoedinger, F. O., Columbus, O.
Smith Co., J. B., Philadelphia, Pa.
• Standard Stamping & Perforating Co., Chicago, Ill.
• Stewart Mfg. Co., Inc., Bloomfield, N. J.
• Tuttle & Bailey, Inc., New Britain, Conn.
• United States Air Conditioning Corp., Minneapolis, Minn.
United States Register Co., Battle Creek, Mich.
Utility Appliance Corp., Los Angeles, Calif.
• Waterloo Register Sales Co., Waterloo, Ia.
Western Wire & Iron Works, Inc., Chicago, Ill. (metal)
Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Young Regulator Co., Cleveland, O.

GUNS AND POTS, SMOKE AND SMUDGE, FOR TESTING AIR MOVEMENT

Hill, E. Vernon, Chicago, Ill.
Newman Co., Inc., I. C., New York, N. Y. (smoke containers)
Pains Fireworks Display Co., New York, N. Y.

HAND SHEARS

See Shears and Snips, Hand

HANGERS OR BRACKETS, RADIATOR

American Foundry & Furnace Co., Bloomington, Ill.
American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arjac Products, Inc., Rochester, N. Y.
• Bell & Gossett Co., Morton Grove, Ill.
Carpenter & Paterson, Inc., East Boston, Mass.
• Carty & Moore Engineering Co., Detroit, Mich.
• Crane Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Hartmann Co., Chas., Brooklyn, N. Y.
Healy Ruff Co., St. Paul, Minn.
Jennison Co., Fitchburg, Mass. (Adjustable radiator foot rest)
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
National Radiator Co., The, Johnstown, Pa.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
United States Radiator Corp., Detroit, Mich.
Western Hanger Co., San Francisco, Calif.

HANGERS AND SUPPORTS, PIPE

Acme Tin Plate & Roofing Supply Co., Philadelphia, Pa.
American District Steam Co., North Tonawanda, N. Y.
Carpenter & Paterson, Inc., East Boston, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
• Crane Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Frick Co., Waynesboro, Pa.
Genspring, Inc., New York, N. Y.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Jarecki Mfg. Co., Erie, Pa.
• Midwest Piping & Supply Co., Inc., St. Louis, Mo.
• Minerallac Electric Co., Chicago, Ill.
• Moore Co., Goodloe E., Danville, Ill.
• National Valve & Mfg. Co., Pittsburgh, Pa.
Packless Metal Products Corp., New Rochelle, N. Y.
(Flexible fasteners for metal hose and tubing)
Paine Co., Chicago, Ill.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
Ravena Iron Co., Ravena, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

● Ric-wiL Co., Cleveland, O. (Underground)
Rockwood Sprinkler Co., Worcester, Mass.
Roessing Mfg. Co., Pittsburgh, Pa.
Truscon Steel Co., Youngstown, O.
● Walworth Co., New York, N. Y.
Western Wire Products Co., St. Louis, Mo.

HARD RUBBER PIPE AND FITTINGS

See Pipe, Hard Rubber; Fittings, Pipe, Hard Rubber

HEADERS, WELDED

● Acme Industries, Inc., Jackson, Mich.
American Locomotive Co., Alco Products Div., New York, N. Y.
● Baker Ice Machine Co., Inc., Omaha, Neb.
Ball Welding Works, San Francisco, Calif.
Biggs Boiler Works Co., E. Akron, O.
Chicago Nipple Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Columbian Steel Tank Co., Kansas City, Mo.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
● Crane Co., Chicago, Ill.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Flori Pipe Co., The, St. Louis, Mo.
Frick Co., Waynesboro, Pa.
● Grinnell Co., Inc., Providence, R. I.
International Engineering Wks., Inc., Framingham, Mass.
Kellogg Co., M. W., The, New York, N. Y.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Lumsden & Van Stone Co., South Boston, Mass.
● Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
● Naylor Pipe Co., Chicago, Ill.
Ohio Pipe Bending & Mach. Co., Cleveland, O.
Oiljack Mfg. Co., Inc., Montclair, N. J.
● Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
● Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Corp., New York, N. Y.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw-Kendall Engineering Co., Toledo, O.
Vilter Mfg. Co., Milwaukee, Wis.
● Walworth Co., New York, N. Y.
Western Piping & Engineering Co., San Francisco, Calif.
● Whitlock Mfg. Co., Hartford, Conn.

HEADS, EXHAUST, FOR PIPE LINES

Aeolus Dickinson, Chicago, Ill.
Cochrane Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Dickinson, Aeolus, Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Hoppes Mfg. Co., Springfield, O.
● Illinois Engineering Co., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Wright-Austin Co., Detroit, Mich.

HEADS, SPRINKLER

April Showers Co., Washington, D. C.
Binks Mfg. Co., Chicago, Ill.
Cleghorn Co., Boston, Mass.
● Grinnell Co., Inc., Providence, R. I.
Hodgman Mfg. Co., Taunton, Mass.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Ross Sprinkler Co., Pasadena, Calif.

HEAT EXCHANGERS

See Chillers, Water; Condensers, Refrigerating; Exchangers, Heat; Surface, Cooling; Surface, Heating

HEAT PUMPS

See Units, Air Conditioning, Reverse Refrigeration Cycle

HEATERS, AIR, DIRECT FIRED

● Air Devices, Inc., New York, N. Y.
● Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
American Furnace Co., St. Louis, Mo.
Beck Engineering Combustion Kompany, St. Louis, Mo.
● Campbell Heating Co., Des Moines, Ia.
Campbell Heating Co., E. K., Kansas City, Mo.
Columbus Heating & Ventilating Co., Columbus, O.
Davis Co., Inc., Herbert H., Chicago, Ill.
Despatch Oven Co., Minneapolis, Minn.
● Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Electromode Corp., Div. of American Foundry Equipment Co., Mishawaka, Ind.
● Fitzgibbons Boiler Co., Inc., New York, N. Y.
General Gas Light Co., Kalamazoo, Mich.
● Jackson & Church Co., Saginaw, Mich.
Lee Engineering Co., Youngstown, O.
Magirl Foundry & Furnace Wks., P. H., Bloomington, Ill.
McCann Furnace Co., Cleveland, O.
Meyer Furnace Co., The, Peoria, Ill.
● Mid-Continent Metal Products Co., National Gas Burner Div., Chicago, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Heater Co., Minneapolis, Minn.
National Mfg. & Engineering Co., Detroit, Mich.
Nelson Co., Detroit, Mich.
Newcomb Engineering Co., Grand Rapids, Mich.
Palmer Mfg. Corp., Phoenix, Ariz.
Ross Engineering Corp., J. O., New York, N. Y.
Sawyer Heating Co., Detroit, Mich.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Smith, Inc., James Campbell, Cleveland, O.
Surface Combustion Corp., Toledo, O.
XXth Century Heating and Ventilating Co., Akron, O.
Whiting Corp., Harvey, Ill.
Williams, Inc., F. C., Dearborn, Mich.

HEATERS, CONVECTION

See Radiation, Convection Type

HEATERS, DUCT, ELECTRIC

Brown Fintube Co., The, Elyria, O.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Despatch Oven Co., Minneapolis, Minn.
Falcon Equipment Co., New Brighton, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hynes Electric Heating Co., Camden, N. J.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
Trent Co., Harold E., Philadelphia, Pa.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.
● Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, DUCT, GAS

Beck Engineering Combustion Kompany, St. Louis, Mo.
Bryant Heater Co., The, Cleveland, O.
● Dravo Corp., Pittsburgh, Pa.
General Gas Light Co., Kalamazoo, Mich.
International Sales Co., San Francisco, Calif.
Kehm Corp., The, Chicago, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace Co., Beverly Hills, Calif.
Reznor Mfg. Co., Mercer, Pa.
Royal Heaters, Inc., Alhambra, Calif.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Surface Combustion Corp., Toledo, O.
XXth Century Heating and Ventilating Co., Akron, O.
Utility Appliance Corp., Los Angeles, Calif.

HEATERS, FEEDWATER

See Deaerators

HEATERS, GASOLINE FIRED (FOR AIRCRAFT AND PORTABLE GROUND USE)

Fluid Heat Div., Anchor Post Fence Co., Baltimore, Md.
Selas Corp of America, Strato-Heater Div., Philadelphia, Pa.
Stewart-Warner Corp., Chicago, Ill.
Surface Combustion Corp., Toledo, O.

HEATERS, INDIRECT, SUBMERGED

American District Steam Co., North Tonawanda, N. Y.
● Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., Elyria, O.
Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Newark, N. J.
Frank Heaters, Inc., Paterson, N. J.
● General Fittings Co., Providence, R. I.
Gerstein & Cooper Co., South Boston, Mass.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Taco Heaters, Inc., New York, N. Y.
Western Blower Co., Seattle, Wash.

HEATERS, STEAM JET, FOR LIQUIDS

Gerstein & Cooper Co., South Boston, Mass.
Penberthy Injector Co., Detroit, Mich.
Schutte & Koerting Co., Philadelphia, Pa.

HEATERS, STRIP AND IMMERSION, ELECTRIC

American Instrument Co., Silver Spring, Md.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Electric Arc, Inc., Newark, N. J.
Falcon Equipment Co., New Brighton, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
H. & A. Co., Buffalo, N. Y.
Hynes Electric Heating Co., Camden, N. J.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Red Spot Electric Co., Tacoma, Wash.
Techtmann Industries, Inc., Milwaukee, Wis.
Trent Co., Harold E., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.
• Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, UNIT, ELECTRIC HEATING ELEMENT

Consolidated Car-Heating Co., Inc., Albany, N. Y.
Electromode Corp., Div. American Foundry Equipment Co., Mishawaka, Ind.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Heating Assurance, Inc., Spokane, Wash.
Hynes Electric Heating Co., Camden, N. J.
• Ilg Electric Ventilating Co., Chicago, Ill.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Lintern Co., Berea, O.
Red Spot Electric Co., Tacoma, Wash.
Trent Co., Harold E., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.
• Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, UNIT, GAS FIRED

• Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
Automatic Gas Equipment Co., Pittsburgh, Pa.
Beck Engineering Combustion Kompany, St. Louis, Mo.
Bryant Heater Co., The, Cleveland, O.
Clow & Sons, James B., Chicago, Ill.
• Dravo Corp., Pittsburgh, Pa.
General Gas Light Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Lee Engineering Co., Youngstown, O.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nat Corp., Kansas City, Mo.
Norman Products Co., Inc., Columbus, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Reznor Mfg. Co., Mercer, Pa.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Surface Combustion Corp., Toledo, O.
Utility Appliance Corp., Los Angeles, Calif.
• Zink Co., John, Tulsa, Okla.

HEATERS, UNIT, OIL FIRED

• Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
Beck Engineering Combustion Kompany, St. Louis, Mo.
• Dravo Corp., Pittsburgh, Pa.
Lee Engineering Co., Youngstown, O.
Sawyer Heating Co., Detroit, Mich.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.

HEATERS, UNIT, STEAM AND HOT WATER

• Airtherm Mfg. Co., St. Louis, Mo.
• American Blower Corp., Detroit, Mich.
• American Thermal Industries, Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Beacon-Morris Corp., Boston, Mass.
Bern's Specialty Mfg. Co., Chicago, Ill.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
• Buffalo Forge Co., Buffalo, N. Y.
• Burnham Boiler Corp., Irvington, N. Y.
Caldwell Co., Wm. J., Washington, D. C.
Campbell Heating Co., E. K., Kansas City, Mo.
Carrier Corp., Syracuse, N. Y.
Champion Unit Heater Co., Chicago, Ill.
Chicago Fan & Fin Coil Co., Chicago, Ill.
• Clarage Fan Co., Kalamazoo, Mich.
Doyle & Roth Mfg. Co., Newark, N. J.
• Dunham Co., C. A., Chicago, Ill.
• Fedders-Quigan Corp., Buffalo, N. Y.
• Grinnell Co., Inc., Providence, R. I.
Hartzell Propeller Fan Co., Piqua, O.
Hastings Air Conditioning Co., Hastings, Neb.
Heat Transfer Products, Inc., Carbondale, Pa.
• Ilg Electric Ventilating Co., Chicago, Ill.
Industrial Mfg. & Engrg. Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Johnson Fan & Blower Corp., Chicago, Ill.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
• Marlo Coil Co., St. Louis, Mo.
• McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Modine Mfg. Co., Racine, Wis.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
Nelson Corp., Herman, Moline, Ill.
• Nesbitt, Inc., John J., Philadelphia, Pa.
New York Blower Co., Chicago, Ill.
Niagara Blower Co., New York, N. Y.
Refrigeration Economics Co., Inc., Canton, O.
• Rittling Corp., The, Buffalo, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Semco Mfg. Co., Nashville, Tenn.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
• Trane Co., The, La Crosse, Wis.
• United States Air Conditioning Corp., Minneapolis, Minn.
• Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
• Wing Mfg. Co., L. J., New York, N. Y.
Young Radiator Co., Racine, Wis.

HEATERS, VENTILATION

See Ventilators, Unit

HEATERS, WATER, CAST IRON, COAL FIRED

Adams Co., The Dubuque, Ia.
American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
• Burnham Boiler Corp., Irvington, N. Y.
Cleghorn Co., Boston, Mass.
• Crane Co., Chicago, Ill.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
• Gehl Bros. Mfg. Co., West Bend, Wis.
Glo Heat Equipment Co., New York, N. Y.
Pittsburgh Water Heater Corp., Pittsburgh, Pa.
International Heater Co., Utica, N. Y.
Prox Co., Inc., Frank, Terre Haute, Ind.
• Smith Co., Inc., H. B., The, Westfield, Mass.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

HEATERS, WATER, ELECTRIC

Bogue Electric Co., Paterson, N. J.
Brown Fintube Co., Elyria, O.
• Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Edison General Electric Appliance Co., Inc., Chicago, Ill.
Gerstein & Cooper Co., South Boston, Mass.
Glo Heat Equipment Co., New York, N. Y.
Hotstream Heater Co., Cleveland, O.
Hynes Electric Heating Co., Camden, N. J.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Red Spot Electric Co., Tacoma, Wash.
Rheem Mfg. Co., New York, N. Y.
Smith Corp., A. O., Milwaukee, Wis.
Trent Co., Harold E., Philadelphia, Pa.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.

HEATERS, WATER, GAS FIRED

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Birchfield Boiler, Inc., Tacoma, Wash.
Brown Fintube Co., Elyria, O.
Bryant Heater Co., The, Cleveland, O.
• Clayton & Lambert Mfg. Co., Louisville, Ky.
• Crane Co., Chicago, Ill.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Eclipse Fuel Engineering Co., Rockford, Ill.
Gerstein & Cooper Co., South Boston, Mass.
Glo Heat Equipment Co., New York, N. Y.
Handley Brown Heater Co., Jackson, Mich.
Hotstream Heater Co., Cleveland, O.
Kreano-Stamm Mfg. Co., New York, N. Y.
Mission Appliance Corp., Los Angeles, Calif.
Montgomery Bros., San Francisco, Calif.
Mueller Furnace Co., L. J., Milwaukee, Wis.
National Radiator Co., The, Johnstown, Pa.
Norman Products Co., Inc., Columbus, O.
Peerless Mfg. Corp., Louisville, Ky.
Pittsburgh Water Heater Corp., Pittsburgh, Pa.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
Rheem Mfg. Co., New York, N. Y.
Rotary Mfg. Co., Los Angeles, Calif.
Ruud Mfg. Co., Pittsburgh, Pa.
Schoedinger, F. O., Columbus, O.
Sellers Engineering Co., Chicago, Ill.
• Smith Co., Inc., H. B., The, Westfield, Mass.
Smith Corp., A. O., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
United States Radiator Corp., Detroit, Mich.

HEATERS, WATER, INDIRECT

Akwa Heaters, Inc., New York, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
• Bell & Gossett Co., Morton Grove, Ill.
Dahlquist Mfg. Co., Somerville, Mass.
Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Newark, N. J.
Ferguson & Lange Foundry Co., Chicago, Ill.
• General Fittings Co., Providence, R. I.

• Advertisement in this issue. See **Index to Advertisers, pages 343-344.**

Gerstein & Cooper Co., South Boston, Mass.
Hotstream Heater Co., Cleveland, O.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Kehm Corp., The, Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Taco Heaters, Inc., New York, N. Y.
● Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Vapor Car Heating Co., Inc., Chicago, Ill.
Western Blower Co., Seattle, Wash.

HEATERS, WATER, INDIRECT, COMBINATION TANK AND TANKLESS

● Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Burnham Boiler Corp., Irvington, N. Y.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Newark, N. J.
Gerstein & Cooper Co., South Boston, Mass.
Hotstream Heater Co., Cleveland, O.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
Peerless of America, Inc., Chicago, Ill.
Penberthy Injector Co., Detroit, Mich.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
● Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.

HEATERS, WATER, OIL FIRED

Aeroil Products Co., West New York, N. J. (portable)
● Air Devices, Inc., New York, N. Y.
● Airtemp, Div. of Chrysler Corp., Dayton, O.
Aldrich Co., The, Wyoming, Ill.
Auburn Burner Co., Auburn, Ind.
Bethlehem Foundry & Machine Co., Bethlehem, Pa.
Birchfield Boiler, Inc., Tacoma, Wash.
Brown Fintube Co., The, Elyria, O.
Century Engineering Corp., Cedar Rapids, Ia.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
Gerstein & Cooper Co., South Boston, Mass.
Glo Heat Equipment Co., New York, N. Y.
Hotstream Heater Co., Cleveland, O.
Johnson Co., S. T., Oakland, Calif.
Kleen-Heet, Inc., Chicago, Ill.
Kresno-Stamm Mfg. Co., New York, N. Y.
Lonergan Mfg. Co., Albion, Mich.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Nu-way Corp., The, Rock Island, Ill.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
● Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ray Oil Burner Co., San Francisco, Calif.
Reif-Rexoil, Inc., Buffalo, N. Y.
Rheem Mfg. Co., New York, N. Y.
Scott-Newcomb, Inc., St. Louis, Mo.
● Smith Co., Inc., H. B., The, Westfield, Mass.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.
Vapor Car Heating Co., Inc., Chicago, Ill.
Viking Mfg. Corp., Cleveland, O.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
York Electric and Machine Co., York, Pa.
York-Heat Div., York-Shipley, Inc., York, Pa.

HEATERS, WATER, STEAM, INSTANTANEOUS

Akwa Heaters, Inc., New York, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
● Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Brownell Co., Dayton, O.
Coe Mfg. Co., Painesville, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Eclipse Fuel Engineering Co., Rockford, Ill.
Frank Heaters, Inc., Paterson, N. J.
● General Fittings Co., Providence, R. I.
Gerstein & Cooper Co., South Boston, Mass.
Hasco Valve & Machine Co., Milwaukee, Wis.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Wks. & Alberger Heater Co., Buffalo, N. Y.
Johnson Corp., Three Rivers, Mich.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Montgomery Bros., San Francisco, Calif.
Marion Machine Foundry & Supply Co., Marion, Ind.
National Pipe Bending Co., New Haven, Conn.
O'Brien Steam Specialty Co., Syracuse, N. Y.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pick Mfg. Co., West Bend, Wis. (direct steam injection.
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Swartwout Co., Cleveland, O.
Taco Heaters, Inc., New York, N. Y.
● Whitlock Mfg. Co., Hartford, Conn.

HEATERS, WATER, STEAM, STORAGE

Akwa Heaters, Inc., New York, N. Y.
American District Steam Co., North Tonawanda, N. Y.
● Bell & Gossett Co., Morton Grove, Ill.
● Burnham Boiler Corp., Irvington, N. Y.
Bros Boiler & Manufacturing Co., Wm., Minneapolis, Minn.
● Brownell Co., Dayton, O.
● Burnham Boiler Corp., Irvington, N. Y.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Co., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Frank Heaters, Inc., Paterson, N. J.
● General Fittings Co., Providence, R. I.
Gerstein & Cooper Co., South Boston, Mass.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Wks. & Alberger Heater Co., Buffalo, N. Y.
International Engineering Wks., Inc., Framingham, Mass.
Johnson Corp., Three Rivers, Mich.
● Kewanee Boiler Corp., Kewanee, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Manitowoc Boiler Wks., Manitowoc, Wis.
Marion Machine Foundry & Supply Co., Marion, Ind.
National Pipe Bending Co., New Haven, Conn.
O'Brien Steam Specialty Co., Syracuse, N. Y.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Penberthy Injector Co., Detroit, Mich.
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Rotary Mfg. Co., Los Angeles, Calif.
● Schaub Engineering Co., Fred H., Chicago, Ill.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Stout & Sons, David, St. Louis, Mo.
Swartwout Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
Warren Electric Appliance Co., Warren, Pa. (Electric)
Waterfilm Boilers, Inc., Jersey City, N. J.
Western Blower Co., Seattle, Wash.
● Whitlock Mfg. Co., Hartford, Conn.

HEATERS, WATER, STEEL, COAL FIRED

Aeroil Products Co., West New York, N. J. (Portable)
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Catskill Metal Works, Inc., Catskill, N. Y.
● Fitzgibbons Boiler Co., New York, N. Y.
International Engineering Wks., Inc., Framingham, Mass.
Johnson Bros., Inc., Ferrysburg, Mich.
● Kewanee Boiler Corp., Kewanee, Ill.
Lookout Boiler & Mfg. Co., Chattanooga, Tenn.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Rheem Mfg. Co., San Francisco, Calif.
Spencer Heater Div., The Aviation Corp., Williamsport, Pa.
Terra Haute Boiler Works Co., Terre Haute, Ind.

HEATING BOILERS

See Boilers, Heating

HEATING COILS

See Surface, Heating

HEATING SURFACE

See Surface, Heating

HOSE CLAMPS

See Clamps, Hose

HOSE, METAL, AND FITTINGS

Aeroquip Corp., Jackson, Mich.
American Metal Hose Branch, American Brass Co., Waterbury, Conn.
Atlantic Metal Hose Co., Inc., New York, N. Y.
Bendix Aviation Corp., Eclipse—Pioneer Div., Metal Hose Dept., Teterboro, N. J.
Chicago Metal Hose Corp., Maywood, Ill.
Everhot Products Co., Chicago, Ill.
Gates Engineering Co., Wilmington, Del.
Packless Metal Products Corp., New Rochelle, N. Y.
Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Seamlex Co., Inc., Long Island City, N. Y.
Titeflex, Inc., Newark, N. J.
United Metal Hose Co., Inc., Long Island City, N. Y.
● Zallea Brothers & Johnson, Wilmington, Del.

● Advertisement in this issue. **See Index to Advertisers, pages 343-344.**

HOSE, NON-METAL, AND FITTINGS

Aeroquip Corp., Jackson, Mich.
American Ventilating Hose Co., New York, N. Y.
Boston Woven Hose & Rubber Co., Boston, Mass.
Goodrich Co., B. F., Akron, O.
DeVilbiss Co., The, Toledo, O.
Independent Pneumatic Tool Co., Chicago, Ill.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Republic Rubber Div., Lee Rubber and Tire Corp., Youngstown, O.
Resistoflex Corp., Belleville, N. J.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
• Tinnerman Products, Inc., Cleveland, O. (Clamps)
United States Rubber Co., New York, N. Y.
Warner Bros. Co., Spiratube Div., Bridgeport, Conn.

HOT WATER HEATING SYSTEMS

See Systems, Heating, Hot Water

HOSE, VENTILATING

See Ducts and Duct Fittings,, Prefabricated, Non-Metallic

HOT WATER HEATING SYSTEMS, BALANCING ELBOWS FOR

See Elbows, Balancing, for Hot Water Heating System

HOT WATER PRESSURE REGULATORS

See Regulators, Pressure, Hot Water Heating Systems

HOUSINGS, FAN, CENTRIFUGAL

(Housing only—not complete fans)

• Bishop & Babcock Mfg. Co., Cleveland, O.
Brundage Co., The, Kalamazoo, Mich.
• Burden Co., Los Angeles, Calif.
Circulator & Devices Mfg. Corp., New York, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Commercial Shearing & Stamping Co., Youngstown, O.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Detroit Stamping Co., Detroit, Mich.
Gates Engineering Co., Wilmington, Del.
Hastings Air Conditioning Co., Inc., Hastings, Neb.
• Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
National Mfg. & Engineering Co., Detroit, Mich.
Northern Blower Co., Cleveland, O.
Sandberg Sheet Metal Works, Portland, Ore.
Schwitzer-Cummins Co., Indianapolis, Ind.
• United States Air Conditioning Corp., Minneapolis, Minn.
Utica Products, Inc., Utica, N. Y.
Viking Air Conditioning Corp., Cleveland, O.

HOUSINGS, FAN, PROPELLER

(Housings only—not complete fans)

Circulators & Devices Mfg. Corp., New York, N. Y.
Commercial Shearing & Stamping Co., Youngstown, O.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Gates Engineering Co., Wilmington, Del.
Schwitzer-Cummins Co., Indianapolis, Ind.

HUMIDIFIERS, CENTRAL PLANT

• Air & Refrigeration Corp., New York, N. Y.
• American Blower Corp., Detroit, Mich.
• Annis Air Filters, Glendale, Calif.
• Armstrong Machine Wks., Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Carrier Corp., Syracuse, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Cleveland Humidifier Co., Cleveland, O.
Farr Co., Los Angeles, Calif.
• Johnson Service Co., Milwaukee, Wis.
• McDonnell & Miller, Inc., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
National Engineering & Mfg. Co., Kansas City, Mo.
Parks-Cramer Co., Fitchburg, Mass.
• Powers Regulator Co., Chicago, Ill.
Research Corp., New York, N. Y.
Skuttle Mfg. Co., Detroit, Mich.
Steamaire Co., Cincinnati, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Surface Combustion Corp., Toledo, O.
• Trane Co., The, La Crosse, Wis.
Viking Air Conditioning Corp., Cleveland, O.
Vilter Mfg. Co., Milwaukee, Wis.
York Corp., York, Pa.

HUMIDIFIERS, DIRECT, SPRAY HEAD

American Moistening Co., Providence, R. I.
Anetsberger Bros., Chicago, Ill.
• Armstrong Machine Works, Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C. (Centrifugal).
Binks Mfg. Co., Chicago, Ill.
Blower Application Co., Milwaukee, Wis.
• Buffalo Forge Co., Buffalo, N. Y.
• Chelsea Products, Inc., Irvington, N. J.
Drying Systems, Inc., Chicago, Ill.
• Grinnell Co., Inc., Providence, R. I.
International Moistening Co., Providence, R. I.
Manufacturers Machine Co., North Andover, Mass.
Marley Co., Inc., The, Kansas City, Kans.
• Murray Mfg. Co., D. J., Wausau, Wis.
New York Blower Co., Chicago, Ill.
Parks-Cramer Co., Fitchburg, Mass.
Pfening Co., Fred D., Columbus, O.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Somers, Inc., H. J., Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
• Spraying Systems Co., Chicago, Ill.
Steamaire Co., Cincinnati, O.
Supreme Electric Products Corp., Rochester, N. Y.
• Trane Co., The, LaCrosse, Wis.
Utility Appliance Corp., Los Angeles, Calif.
Water Cooling Corp., New York, N. Y.

HUMIDIFIERS FOR RADIATORS AND CONVECTORS

Bridgeport Brass Co., Bridgeport, Conn.
• Maid-O'-Mist, Inc., Chicago, Ill.
Patent Novelty Co., Fulton, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.
Techtmann Industries, Inc., Milwaukee, Wis.

HUMIDIFIERS, RADIATOR VENT VALVE

• Maid-O'-Mist, Inc. Chicago, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.

HUMIDIFIERS, UNIT, ROOM TYPE (Without Heating)

Carrier Corp., Syracuse, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Lion Mfg. Corp., Chicago, Ill.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
Norwood Filtration Co., The, Florence, Mass.
Skilbeck Mfg. Co., Kenosha, Wis.
Somers, Inc., H. J., Detroit, Mich.
• Spraying Systems Co., Chicago, Ill.
Standard Engineering Wks., Pawtucket, R. I.
Steamaire Co., Cincinnati, O.
• United States Air Conditioning Corp., Minneapolis, Minn.
Water Cooling Corp., New York, N. Y.

HUMIDIFYING RADIATORS

See Radiators, Humidifying

HUMIDISTATS

American Moistening Co., Providence, R. I.
• Autempco Corp., New York, N. Y.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
H-B Instrument Co., Philadelphia, Pa.
• Johnson Service Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Parks-Cramer Co., Fitchburg, Mass.
• Penn Electric Switch Co., Goshen, Ind.
• Powers Regulator Co., Chicago, Ill.
Standard Engineering Wks., Pawtucket, R. I.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• White-Rodgers Electric Co., St. Louis, Mo.

HUMIDITY RECORDERS

See Recorders, Humidity

HUMIDITY AND TEMPERATURE CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

HYDRAULIC PIPE PUSHERS

See Pushers, Pipe, Hydraulic

HYDRAULIC SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling

HYDROMETERS

American Moistening Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Fee and Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon, Chicago, Ill.
International Moistening Co., Providence, R. I.
• Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa. (recording).
Moeller Instrument Co., Richmond Hill, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Palmer Co., Cincinnati (Norwood), O.
Parks-Cramer Co., Fitchburg, Mass.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.
● White-Rodgers Electric Co., St. Louis, Mo.

HYGROSTATS

See Humidistats

IMMERSION THERMOSTATS

See Thermostats, Immersion

INDICATING THERMOMETERS

See Thermometers, Indicating

INDICATOR-CONTROLLERS, PRESSURE

Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Cook Electric Co., Chicago, Ill.
Electro Products Laboratories, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
● Gotham Instrument Co., Inc., New York, N. Y.
Hays Corp., Michigan City, Ind.
● Illinois Engineering Co., Chicago, Ill.
Leeds & Northrup Co., Philadelphia, Pa.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Co., Div. of Climax Industries, Inc., Chicago, Ill.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

INDICATOR-CONTROLLERS, RELATIVE HUMIDITY

Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Foxboro Co., Foxboro, Mass.
● Gotham Instrument Co., Inc., New York, N. Y.
● Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.

INDICATOR-CONTROLLERS, TEMPERATURE

Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Foxboro Co., Foxboro, Mass.
● Gotham Instrument Co., Inc., New York, N. Y.
● Illinois Engineering Co., Chicago, Ill.
● Illinois Testing Laboratories, Inc., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Mason-Neilan Regulator Co., Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., New York, N. Y.
● Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
Wheelco Instruments Co., Chicago, Ill.

INDICATORS, CARBON DIOXIDE, BOILER ROOM

For portable CO_2 analyzers, see Analyzers, Carbon Dioxide, Portable
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Davis Emergency Equipment Co., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Chas., Newark, N. J.
Ess Instrument Co., Bergenfield, N. J.
Hays Corp., Michigan City, Ind.
Leeds & Northrup Co., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
Weaver Mfg. Co., Springfield, Ill.

INDICATORS, FLOW

See Meters, Flow

INDICATORS, LIQUID LEVEL

Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Cook Electric Co., Chicago, Ill.
Hays Corp., Michigan City, Ind.
Healy Ruff Co., St. Paul, Minn.
Mason-Neilan Regulator Co., Boston, Mass.
Meriam Instrument Co., The, Cleveland, O.
Moore Products Co., Philadelphia, Pa.
Petrometer Corp., Long Island City, N. Y.
● Stephens-Adamson Mfg. Co., Aurora, Ill.
● Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
Wallace & Tiernan Co., Inc., Newark, N. J.
Weatherhead Co., Cleveland, O.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
● Yarnall-Waring Co., Philadelphia, Pa.

INDICATORS, SOUND LEVEL

General Electric Co., Apparatus, Dept., Schenectady, N. Y.

INDIRECT HEATING SURFACE

See Surface, Heating

INDIRECT WATER HEATERS

See Heaters, Water, Indirect

INDUSTRIAL AIR CONDITIONERS

See Units, Air Conditioning, Industrial Type

INDUSTRIAL DRYERS

See Dryers, Industrial

INSTANTANEOUS WATER HEATERS

See Heaters, Water, Steam, Instantaneous

INSULATION, BOILER AND TANK

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Insulation Co., Inc., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
Armstrong Cork Co., Lancaster, Pa. (85% Magnesia)
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Cork Import Corp., Englewood, N. J. (Cork, mineral wool board)
Cork Insulation Co., Inc., New York, N. Y. (Cork)
Eagle-Picher Co., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Magnesia)
● Grant Wilson, Inc., Chicago, Ill.
Green Fire Brick Co., A. P., Mexico, Mo.
Hinde & Dauch Paper Co., Sandusky, O.
International Vermiculite Co., Girard, Ill.
Jamar Co., Walker, Duluth, Minn.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y. (Asbestos)
Keasbey & Mattison Co., Ambler, Pa.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Clay Products Co., St. Louis, Mo.
● Mundet Cork Corp., Brooklyn, N. Y. (Cork)
Munn and Steele, Inc., Newark, N. J.
National Gypsum Co., Buffalo, N. Y. (Rock wool)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and magnesia)
● Owens-Corning Fiberglas Corp., Toledo, O. (Blanket)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Blanket, block, cement)
Reynolds Metals Co., Richmond, Va.
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia)
Sall Mountain Co., Chicago, Ill.
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.

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Telsit Insulation Co., Bronx, N. Y.
Tennessee Products Corp., Nashville, Tenn.
Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Co., Kearny, N. J. (Cork)
Universial Zonolite Insulation Co., Chicago, Ill. (Plastic)
Walker Jamar Co., Duluth, Minn.
● Wilson, Inc., Grant, Chicago, Ill.

INSULATION, BUILDING

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Rock wool)
Alfol Insulation Co., Inc., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
● Aluminum Co. of America, Pittsurgh, Pa.
American Flange & Mfg. Co., Inc., New York, N. Y. (Metal sheets)
American Hair & Felt Co., Chicago, Ill. (Hair felt)
Armstrong Cork Co., Lancaster, Pa. (Corkboard, fibreboard)
Bache & Co., Semon, New York, N. Y. (Glass wool)
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Rock wool)
Carney Co., Inc., The, Mankato, Minn.
Celotex Corp., The, Chicago, Ill.
Certain-teed Products Corp., New York, N. Y. (Board, reflective)
Chamberlin Co. of America, Detroit, Mich. (Rock wool)
Cork Import Corp., Englewood, N. J. (Cork, mineral wool board)
Cork Insulation Co., Inc., New York, N. Y. (Corkboard)
Doheny Co., John J., Belmont, Mass. (Blanket)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool, blankets, batts, granulated, loose)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fir-Tex Insulating Board Co., St. Helens, Ore. (Wood fibre-board)
Flintkote Co., The, New York, N. Y. (Fiber board and rock wool)
General Insulating Products Co., Brooklyn, N. Y. (Rock wool)
● Grant Wilson, Inc., Chicago, Ill. (Rockwool)
Hinde & Dauch Paper Co., Sandusky, O.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wood fibre)
Insul-Wool Insulation Corp., Wichita, Kans.
International Vermiculite Co., Girard, Ill. (Loose fill)
Johns-Manville, New York, N. Y. (Rock wool and wood fibre board)
Johnston Tin Foil & Metal Co., St. Louis, Mo. (Foil, aluminum, tin, lead)
Keasbey Co., Robert A., New York, N. Y. (Rock wool)
Keasbey & Mattison Co., Ambler, Pa. (Asbestos)
Kimberly-Clark Corp., Neenah, Wis.
Masonite Corp., Cellufoam Products Div., Chicago, Ill.
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Multi-Cell Sales Corp., Minneapolis, Minn. (Blanket, quilted newspaper)
● Mundet Cork Corp., Brooklyn, N. Y. (Cork)
Munn & Steele, Inc., Newark, N. J.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
● Owens-Corning Fiberglass Corp., Toledo, O.
Pacific Lumber Co., The, San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Plastergon Wall Board Co., Buffalo, N. Y. (Rigid board)
Poe Co., C. W., Cleveland, O.
Refractory & Insulation Corp., New York, N. Y. (Rock, slag wool)
Reynolds Metal Co., Richmond, Va.
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Mineral wool)
● Russell Co., F. C., The, Cleveland, O.
Semon Bache & Co., New York, N. Y. (Glass wool)
Silvercote Products, Inc., Chicago, Ill.
Specialty Converters, Inc., East Braintree, Mass. (Reflective Insulation)
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hairfelt)
Standard Lime & Stone Co., Baltimore, Md. (Rock wool)
Tennessee Products Corp., Nashville, Tenn.
Truscon Steel Co., Youngstown, O. (Insulation board sealed between metal sheets)
United Cork Companies, Lyndhurst, N. J. (Cork)
United States Gypsum Co., Chicago, Ill. (Wool and board)
United States Mineral Wool Co., Chicago, Ill. (Mineral wool)
Universal Gypsum & Lime Co., Chicago, Ill. (Loose fill)
Universal Zonolite Insulation Co., Chicago, Ill. (Loose fill)
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Western Mineral Products Co., Omaha, Neb.
● Wilson & Co., Inc., Chicago, Ill. (Board)
● Wilson, Inc., Grant, Chicago, Ill. (Rock wool)
Wood Conversion Co., St. Paul, Minn.

INSULATION, CEILING AND WALL, SOUND DEADENING

Acoustical treatment only—for thermal insulation, see Insulation, Building

Alton Mineral Wool Insulation Co., St. Louis, Mo.
American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.
Baldwin-Hill Co., Trenton, N. J.
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Celotex Corp., The, Chicago, Ill.
Doheny Co., John J., Belmont, Mass.
Felters Company, The, Boston, Mass.
Fir-Tex Insulating Board Co., St. Helens, Ore.
General Insulating Products Co., Brooklyn, N. Y.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn.
Insul-Wool Insulation Corp., Wichita, Kans.
Inter-Coastal Paint Corp., East St. Louis, Ill.
Johns-Manville, New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Masonite Corp., Chicago, Ill. (Fibreboard)
● Mundet Cork Corp., Brooklyn, N. Y.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapoils, Minn.
● Owens-Corning Fiberglas Corp., Toledo, O.
Pacific Lumber Co., The, San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Reynolds Metals Co., Richmond, Va.
Robinson Insulation Co., Great Falls, Mont.
Sprayo-Flake Co., Chicago, Ill.
Technical Ply-Woods, Chicago, Ill.
United States Gypsum Co., Chicago, Ill.
Universal Zonolite Insulation Co., Chicago, Ill.
Wood Conversion Co., St. Paul, Minn.

INSULATION, DUCT, SOUND DEADENING

For application inside duct

American Hair & Felt Co., Chicago, Ill.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Celotex Corp., The, Chicago, Ill.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felters Company, The, Boston, Mass.
● Grant Wilson, Inc., Chicago, Ill.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Moore Co., Goodloe E., Danville, Ill.
Mortell Co., J. W., Kankakee, Ill.
● Owens-Corning Fiberglas Corp., Toledo, O.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Reynolds Metals Co., Richmond, Va.
Robinson Insulation Co., Great Falls, Mont.
Telsit Insulation Co., Bronx, N. Y.
United States Rubber Co., New York, N. Y.
Universal Zonolite Insulation Co., Chicago, Ill.
Western Felt Works, Chicago, Ill.
● Wilson, Inc., Grant, Chicago, Ill.

INSULATION, DUCT, THERMAL

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Asbestos)
Alfol Insulation Co., Inc., New York, N. Y. (Aluminum foil)
American Flange & Mfg. Co., Inc., New York, N. Y. (Metal sheets)
American Hair & Felt Co., Chicago, Ill. (Hair felt)
Armstrong Cork Co., Lancaster, Pa. (Corkboard)
Arrowhead Rubber Co., Los Angeles, Calif.
Baldwin-Hill Co., Trenton, N. J.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos)
Celotex Corp., The, Chicago, Ill.
Cork Import Corp., Englewood, N. J. (Cork, mineral wool board)
Cork Insulation Co., Inc., New York, N. Y. (Cork board)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool blankets)
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Cork, magnesia, hair felt)
Felters Company, The, Boston, Mass. (Wool felt)
Fir-Tex Insulating Board Co., St. Helens, Ore. (Wood fibreboard)
General Insulating Products Co., Brooklyn, N. Y. (Acoustic rock wool)
● Grant Wilson, Inc., Chicago, Ill.
Hinde & Dauch Paper Co., Sandusky, O.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wood fibre)
International Vermiculite Co., Girard, Ill. (Block)
Johns-Manville, New York, N. Y. (Rock cork, asbestos)
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
Keasbey & Mattison Co., Ambler, Pa. (Asbestos)
Kennedy, Inc., David E., Brooklyn, N. Y.
Keystone Asphalt Products Co., Chicago, Ill.
Kimberly-Clark Corp., Neenah, Wis.
Masonite Corp., Chicago, Ill.
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Mortell Co., J. W., Kankakee, Ill.
● Mundet Cork Corp., Brooklyn, N. Y. (Cork)
Munn and Steele, Inc., Newark, N. J.
National Gypsum Co., Buffalo, N. Y. (Block)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and wool felt)
● Owens-Corning Fiberglas Corp., Toledo, O. (Blanket)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Block, blanket)
Reynolds Metals Co., Richmond, Va.
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos cellular and laminated sheets or blocks)
Sall Mountain Co., Chicago, Ill. (Asbestos)

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell type)
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hair felt)
Telsit Insulation Co., Bronx, N. Y.
United Cork Companies, Lyndhurst, N. J. (Cork)
United States Mineral Wool Co., Chicago, Ill.
Universal Zonolite Insulation Co., Chicago, Ill. (Plastic)
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Western Felt Wks., Chicago, Ill. (Felt)
● Wilson & Co., Inc., Chicago, Ill. (Flexible)
● Wilson, Inc., Grant, Chicago, Ill.
Wood Conversion Co., St. Paul, Minn.

INSULATION, PIPE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Insulation Co., Inc., New York, N. Y. (Aluminum foil)
American District Steam Co., North Tonawanda, N. Y. (Underground)
American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa. (Cork)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos, magnesia)
Cork Import Corp., Englewood, N. J. (Cork)
Cork Insulation Co., New York, N. Y.
Eagle-Picher Co., Cincinnati, O. (Mineral wool)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
General Electric Co., Chemical Dept., Pittsfield, Mass.
● Grant Wilson, Inc., Chicago, Ill.
International Vermiculite Co., Girard, Ill. (Vermiculite)
Jamar Co., Walker, Duluth, Minn.
Johns-Manville, New York, N. Y. (Asbestos, magnesia, rock cork)
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
Keasbey & Mattison Co., Ambler, Pa. (Asbestos, magnesia)
Masonite Corp., Chicago, Ill.
Monsanto Chemical Co., Merimac Div., Everett, Mass.
Mortell Co., J. W., Kankakee, Ill.
● Mundet Cork Corp., Brooklyn, N. Y. (Cork)
Munn and Steele, Inc., Newark, N. J.
Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
National Gypsum Co., Buffalo, N. Y. (Moulded)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos, magnesia)
● Owens-Corning Fiberglas Corp., Toledo, O. (Sectional and flexible)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Poe Co., C. W., Cleveland, O.
● Porter & Co., Inc., H. W., Newark, N. J. (Underground)
Quigley Co., Inc., New York, N. Y.
● Ric-wiL Co., Cleveland, O. (Underground)
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia, calsilite)
Sall Mountain Co., Chicago, Ill. (Asbestos and wool felt)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell, wool felt and hair felt)
Standard Asbestos Mfg. Co., Chicago, Ill.
Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Companies, Lyndhurst, N. J.
Universal Zonolite Insulation Co., Chicago, Ill.
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Omaha, Neb. (underground)
● Wilson, Inc., Grant, Chicago, Ill.
Wyckoff & Son Co., A., Elmira, N. Y. (Wood)

INSULATION, DRAIN TRAP

● Wilson, Inc., Grant, Chicago, Ill.

IONIZATION APPARATUS

Coroaire Heater Corp., The, Cleveland O.
General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
Norwood Filtration Co., The, Florence, Mass.
United States Ozone Co. of America, Scottdale, Pa.

IRON BODY VALVES

See Valves, Gate; and Valves, Globe

JACKETED PIPE

See Pipe, Jacketed

JOINTS, PIPE, ELECTRICAL INSULATING

Barco Mfg. Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

JOINTS, PIPE, EXPANSION, PACKLESS

American District Steam Co., North Tonawanda, N. Y.
Badger Fire Extinguisher Co., Somerville, Mass.
● Badger & Sons Co., E. B., Boston, Mass. (Corrugated copper, stainless steel)
Barco Mfg. Co., Chicago, Ill.
Belfield Co., H., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Foster Wheeler Corp., New York, N. Y.
● Fulton Sylphon Co., Knoxville, Tenn.
Harris & Co., Arthur, Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
Semet-Solvay Engineering Corp., New York, N. Y.
United States Rubber Co., New York, N. Y.
● Zallea Brothers & Johnson, Wilmington, Del.

JOINTS, PIPE, EXPANSION, SLIP

American District Steam Co., North Tonawanda, N. Y.
Belfield Co., H., Philadelphia, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Clow & Sons, James B., Chicago, Ill.
● Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
● Illinois Engineering Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
Powell Co., Wm., Cincinnati, O.
Q-P Mfg. Co., Needham Heights, Mass.
● Ric-wiL Co., Cleveland, O.
Semet-Solvay Engineering Corp., New York, N. Y.
● Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
● Webster & Co., Warren, Camden, N. J.
● Yarnall-Waring Co., Philadelphia, Pa.

JOINTS, PIPE, FLEXIBLE SWING AND REVOLVING

Barco Mfg. Co., Chicago, Ill.
Bordo Co., Inc., L. J., Glenside, Pa.
Chiksan Co., Brea, Calif.
● Crane Co., Chicago, Ill.
Flexo Supply Co., Inc., St. Louis, Mo.
● Johnson Corp., Three Rivers, Mich.
Moran Flexible Joint Co., Inc., Louisville, Ky.
Patterson-Ballagh Corp., Los Angeles, Calif.
Powell Co., Wm., Cincinnati, O.
Snyder Sales Corp., Los Angeles, Calif.
● Spraying Systems Co., Chicago, Ill.
Water Cooling Corp., New York, N. Y.

JOINTS, UNIVERSAL, FOR OPERATING VALVES

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blood Brothers Machine Co., Allegan, Mich.
Brooks Equipment Corp., Hoboken, N. J.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghampton, N. Y. (flexible shafts)

KATA THERMOMETERS

See Thermometers, Kata

LACQUERS

See Enamels and Lacquers

LAGGING ADHESIVES

See Adhesives, for Pipe Covering

LAMPS, STERILIZING, FOR DUCT INSTALLATION

General Electric Co., Lamp Dept., Nela Park, Cleveland, O.
Westinghouse Electric Corp., Bloomfield, N. J.

LEAD PIPE

See Pipe and Tubing, Lead and Lead Alloy

LEAD SHEETS

See Sheets, Lead

LEAD TUBING

See Pipe and Tubing, Lead and Lead Alloy

LEAK DETECTORS

See Detectors, Leak, Refrigerant

LEATHER BELTING

See Belting, Flat, Leather

LEATHER PACKING

See Packing, Leather

LIGHTS, PILOT AND SIGNAL

Armstrong Heat Control Co., Portland, Ore.
Cooper Co., Clark, Palmyra, N. J.
Dial Light Co. of America, Inc., New York, N. Y.
● General Controls Co., Glendale, Calif.
General Electric Co., Lamp Dept., Nela Park, Cleveland, O.
Hart Mfg. Co., The, Hartford, Conn.
Signal Indicator Co., New York, N. Y.
Westinghouse Electric Corp., Cleveland, O.

● Advertisement in this issue. **See Index to Advertisers, pages 343-344.**

LINKS, FUSIBLE

• Grinnell Co., Inc., Providence, R. I.
Morse-Smith-Morse, Inc., Watertown, Mass.

LIQUID LEVEL GAGES

See Gages, Liquid Level

LIQUID LEVEL INDICATORS

See Indicators, Liquid Level

LIQUID LEVEL RECORDERS

See Recorders, Liquid Level

LIQUID LEVEL REGULATORS

See Regulators, Liquid Level

LIQUID PRESSURE REGULATORS

See Regulators, Pressure, Liquid

LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

LOCK NUTS

See Nuts, Lock

LOUVERS AND SHUTTERS, AUTOMATICALLY OR MANUALLY CONTROLLED

Air Conditioning Products Co., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
Airmaster Corp., Chicago, Ill.
Allen Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
Arex Co., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Belco Exhaust Fan Mfg. Co., St. Louis, Mo.
Biersach & Niedermeyer Co., Milwaukee, Wis.
• Bishop & Babcock Mfg. Co., Cleveland, O.
• Buffalo Forge Co., Buffalo, N. Y.
Burt Mfg. Co., Akron, O.
Campbell Heating Co., E. K., Kansas City, Mo.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
• Chelsea Products, Inc., Irvington, N. J.
Circulators & Devices Mfg. Corp., New York, N. Y.
Clay Equipment Corp., Cedar Falls, Ia.
Conoflow Corp., Philadelphia, Pa.
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., Decatur, Ala.
Dual Air Fan Co., Chicago, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Gillian Mfg. Co., Detroit, Mich.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
• Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
International Steel Co., Evansville, Ind.
Jamieson Mfg. Co., Dallas, Tex.
Johnson Fan & Blower Corp., Chicago, Ill.
Johnson Co., William W., Dayton, O.
Jordan & Co., Paul R., Indianapolis, Ind.
Kelvin-White Co., Boston, Mass.
King Co., The, Owatonna, Minn.
Klee Co., Geo. B., Cincinnati, O.
• Lau Blower Co., Dayton, O.
Leslie Welding Co., Chicago, Ill.
Lockjoint Wood Products Co., Wichita, Kans. (Wood; stationary door, wall, window and ceiling)
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Meyer Mfg. Co., Detroit, Mich.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
Nationalaire Corp., Detroit, Mich.
Nelson Corp., Herman, Moline, Ill.
Peerless Electric Co., Warren, O.
Reed Unit-Fans, Inc., New Orleans, La.
Richmond Fireproof Door Co., Richmond, Ind.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Schoedinger, F. O., Columbus, O.
Shallcross Controls, Inc., Milwaukee, Wis.
Signal Electric Mfg. Co., Menominee, Mich.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
• Standard Stamping & Perforating Co., Chicago, Ill.
Swartwout Co., Cleveland, O.
• Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Victor Electric Products, Inc., Cincinnati, O.
• Waterloo Register Sales Co., Waterloo, Ia.

LOW WATER CUT-OFFS

See Cut-Offs, Low Water, Heating Boiler

MACHINES, BALANCING

See Equipment, Balancing

MACHINES, BLUE PRINT AND WHITE PRINT

For Reproducing Engineering Drawings

American Photocopy Equipment Co., Chicago, Ill.
Bruning Co., Inc., Charles, Long Island City, N. Y.
Dietzgen Co., Eugene, Chicago, Ill.
Ozalid Products Div., General Aniline & Film Corp., Johnson City, N. Y.
Paragon-Revolute Corp., Rochester, N. Y.
Pease Co., C. F., The, Chicago, Ill.
Peck & Harvey, Chicago, Ill.
Wickes Brothers, Saginaw, Mich.

MACHINES AND FILM, X-RAY

Eastman Kodak Co., Rochester, N. Y.
Kelly-Koet, Covington, Ky.
North American Philips Co., Inc., New York, N. Y.
Westinghouse Electric Corp., X-Ray Div., Baltimore, Md.

MACHINES, PIPE CLEANING

Spartan Tool Co., Chicago, Ill.

MACHINES, PIPE CUTTING AND THREADING, PORTABLE

Air Reduction Sales Co., New York, N. Y. (Cutting and beveling)
Beaver Pipe Tools, Inc., Warren, O.
Curtis & Curtis Co., The, Bridgeport, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Linde Air Products Co., The, New York, N. Y. (Cutting and beveling)
National Machine Works, Chicago, Ill.
Nye Tool & Machine Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
• Ridge Tool Co., Elyria, O. (Hand)
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PIPE CUTTING AND THREADING, STATIONARY

Bignall & Keeler Machine Wks., Edwardsville, Ill.
Curtis & Curtis Co., The, Bridgeport, Conn.
Jarecki Mfg. Co., Erie, Pa.
Landis Machine Co., Inc., Waynesboro, Pa.
• Obear, E. L., Los Angeles, Calif.
Oster Mfg. Co., Cleveland, O.
Pines Engineering Co., Inc., Aurora, Ill.
Saunders Machine & Tool Corp., Yonkers, N. Y.
Toledo Pipe Threading Machine Co., Toledo, O.
Wallace Supplies Mfg. Co., Chicago, Ill.

MACHINES, PITTSBURGH LOCK FORMING

Dahlstrom Machine Works, Chicago, Ill.
Lockformer Co., Chicago, Ill.
Maplewood Machinery Co., Inc., Chicago, Ill.
Rafter Machine Co., Inc., Belleville, N. J.
Whitney Metal Tool Co., Rockford, N. J.

MACHINES, REFRIGERATION, ABSORPTION

Vogt Machine Co., Henry, Louisville, Ky.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
• Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

MACHINES, TESTING, WELD

Air Reduction Sales Co., New York, N. Y.

MACHINES, VERTICAL, THREADING AND BORING

Bullard Co., The, Bridgeport, Conn.

MAGNESIUM ALLOY SHEETS

See Sheets, Magnesium Alloy

MAGNESIUM PIPE

See Pipe, Magnesium

MAGNESIUM TUBING

See Tubing, Magnesium

MALLEABLE UNIONS

See Unions, Malleable

MANIFOLDS, REFRIGERATION

Ball Welding Works, San Francisco, Calif.
Doyle & Roth Mfg. Co., Newark, N. J.
Frick Co., Waynesboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
• Mueller Brass Co., Port Huron, Mich.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell type)
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hair felt)
Telsit Insulation Co., Bronx, N. Y.
United Cork Companies, Lyndhurst, N. J. (Cork)
United States Mineral Wool Co., Chicago, Ill.
Universal Zonolite Insulation Co., Chicago, Ill. (Plastic)
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Western Felt Wks., Chicago, Ill. (Felt)
● Wilson & Co., Inc., Chicago, Ill. (Flexible)
● Wilson, Inc., Grant, Chicago, Ill.
Wood Conversion Co., St. Paul, Minn.

INSULATION, PIPE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Insulation Co., Inc., New York, N. Y. (Aluminum foil)
American District Steam Co., North Tonawanda, N. Y. (Underground)
American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa. (Cork)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos, magnesia)
Cork Import Corp., Englewood, N. J. (Cork)
Cork Insulation Co., New York, N. Y.
Eagle-Picher Co., Cincinnati, O. (Mineral wool)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
General Electric Co., Chemical Dept., Pittsfield, Mass.
● Grant Wilson, Inc., Chicago, Ill.
International Vermiculite Co., Girard, Ill. (Vermiculite)
Jamar Co., Walker, Duluth, Minn.
Johns-Manville, New York, N. Y. (Asbestos, magnesia, rock cork)
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
Keasbey & Mattison Co., Ambler, Pa. (Asbestos, magnesia)
Masonite Corp., Chicago, Ill.
Monsanto Chemical Co., Merimac Div., Everett, Mass.
Mortell Co., J. W., Kankakee, Ill.
● Mundet Cork Corp., Brooklyn, N. Y. (Cork)
Munn and Steele, Inc., Newark, N. J.
Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
National Gypsum Co., Buffalo, N. Y. (Moulded)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos, magnesia)
● Owens-Corning Fiberglas Corp., Toledo, O. (Sectional and flexible)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Poe Co., C. W., Cleveland, O.
● Porter & Co., Inc., H. W., Newark, N. J. (Underground)
Quigley Co., Inc., New York, N. Y.
● Ric-wiL Co., Cleveland, O. (Underground)
Robinson Insulation Co., Great Falls, Mont.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia, calsilite)
Sall Mountain Co., Chicago, Ill. (Asbestos and wool felt)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell, wool felt and hair felt)
Standard Asbestos Mfg. Co., Chicago, Ill.
Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Companies, Lyndhurst, N. J.
Universal Zonolite Insulation Co., Chicago, Ill.
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Omaha, Neb. (underground)
● Wilson, Inc., Grant, Chicago, Ill.
Wyckoff & Son Co., A., Elmira, N. Y. (Wood)

INSULATION, DRAIN TRAP

● Wilson, Inc., Grant, Chicago, Ill.

IONIZATION APPARATUS

Coroaire Heater Corp., The, Cleveland O.
General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
Norwood Filtration Co., The, Florence, Mass.
United States Ozone Co. of America, Scottdale, Pa.

IRON BODY VALVES

See Valves, Gate; and Valves, Globe

JACKETED PIPE

See Pipe, Jacketed

JOINTS, PIPE, ELECTRICAL INSULATING

Barco Mfg. Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

JOINTS, PIPE, EXPANSION, PACKLESS

American District Steam Co., North Tonawanda, N. Y.
Badger Fire Extinguisher Co., Somerville, Mass.
● Badger & Sons Co., E. B., Boston, Mass. (Corrugated copper, stainless steel)
Barco Mfg. Co., Chicago, Ill.
Belfield Co., H., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Foster Wheeler Corp., New York, N. Y.
● Fulton Sylphon Co., Knoxville, Tenn.
Harris & Co., Arthur, Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
Semet-Solvay Engineering Corp., New York, N. Y.
United States Rubber Co., New York, N. Y.
● Zallea Brothers & Johnson, Wilmington, Del.

JOINTS, PIPE, EXPANSION, SLIP

American District Steam Co., North Tonawanda, N. Y.
Belfield Co., H., Philadelphia, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Clow & Sons, James B., Chicago, Ill.
● Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Howard Iron Works & Alberger Heater Co., Buffalo, N. Y.
● Illinois Engineering Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
Powell Co., Wm., Cincinnati, O.
Q-P Mfg. Co., Needham Heights, Mass.
● Ric-wiL Co., Cleveland, O.
Semet-Solvay Engineering Corp., New York, N. Y.
● Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
● Webster & Co., Warren, Camden, N. J.
● Yarnall-Waring Co., Philadelphia, Pa.

JOINTS, PIPE, FLEXIBLE SWING AND REVOLVING

Barco Mfg. Co., Chicago, Ill.
Bordo Co., Inc., L. J., Glenside, Pa.
Chiksan Co., Brea, Calif.
● Crane Co., Chicago, Ill.
Flexo Supply Co., Inc., St. Louis, Mo.
● Johnson Corp., Three Rivers, Mich.
Moran Flexible Joint Co., Inc., Louisville, Ky.
Patterson-Ballagh Corp., Los Angeles, Calif.
Powell Co., Wm., Cincinnati, O.
Snyder Sales Corp., Los Angeles, Calif.
● Spraying Systems Co., Chicago, Ill.
Water Cooling Corp., New York, N. Y.

JOINTS, UNIVERSAL, FOR OPERATING VALVES

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blood Brothers Machine Co., Allegan, Mich.
Brooks Equipment Corp., Hoboken, N. J.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghampton, N. Y. (flexible shafts)

KATA THERMOMETERS

See Thermometers, Kata

LACQUERS

See Enamels and Lacquers

LAGGING ADHESIVES

See Adhesives, for Pipe Covering

LAMPS, STERILIZING, FOR DUCT INSTALLATION

General Electric Co., Lamp Dept., Nela Park, Cleveland, O.
Westinghouse Electric Corp., Bloomfield, N. J.

LEAD PIPE

See Pipe and Tubing, Lead and Lead Alloy

LEAD SHEETS

See Sheets, Lead

LEAD TUBING

See Pipe and Tubing, Lead and Lead Alloy

LEAK DETECTORS

See Detectors, Leak, Refrigerant

LEATHER BELTING

See Belting, Flat, Leather

LEATHER PACKING

See Packing, Leather

LIGHTS, PILOT AND SIGNAL

Armstrong Heat Control Co., Portland, Ore.
Cooper Co., Clark, Palmyra, N. J.
Dial Light Co. of America, Inc., New York, N. Y.
● General Controls Co., Glendale, Calif.
General Electric Co., Lamp Dept., Nela Park, Cleveland, O.
Hart Mfg. Co., The, Hartford, Conn.
Signal Indicator Co., New York, N. Y.
Westinghouse Electric Corp., Cleveland, O.

● Advertisement in this issue. **See Index to Advertisers, pages 343-344.**

LINKS, FUSIBLE

● Grinnell Co., Inc., Providence, R. I.
Morse-Smith-Morse, Inc., Watertown, Mass.

LIQUID LEVEL GAGES

See Gages, Liquid Level

LIQUID LEVEL INDICATORS

See Indicators, Liquid Level

LIQUID LEVEL RECORDERS

See Recorders, Liquid Level

LIQUID LEVEL REGULATORS

See Regulators, Liquid Level

LIQUID PRESSURE REGULATORS

See Regulators, Pressure, Liquid

LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

LOCK NUTS

See Nuts, Lock

LOUVERS AND SHUTTERS, AUTOMATICALLY OR MANUALLY CONTROLLED

Air Conditioning Products Co., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
Airmaster Corp., Chicago, Ill.
Allen Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
Arex Co., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Belco Exhaust Fan Mfg. Co., St. Louis, Mo.
Biersach & Niedermeyer Co., Milwaukee, Wis.
● Bishop & Babcock Mfg. Co., Cleveland, O.
● Buffalo Forge Co., Buffalo, N. Y.
Burt Mfg. Co., Akron, O.
Campbell Heating Co., E. K., Kansas City, Mo.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
● Chelsea Products, Inc., Irvington, N. J.
Circulators & Devices Mfg. Corp., New York, N. Y.
Clay Equipment Corp., Cedar Falls, Ia.
Conoflow Corp., Philadelphia, Pa.
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., Decatur, Ala.
Dual Air Fan Co., Chicago, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Gillian Mfg. Co., Detroit, Mich.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
● Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
International Steel Co., Evansville, Ind.
Jamieson Mfg. Co., Dallas, Tex.
Johnson Fan & Blower Corp., Chicago, Ill.
Johnson Co., William W., Dayton, O.
Jordan & Co., Paul R., Indianapolis, Ind.
Kelvin-White Co., Boston, Mass.
King Co., The, Owatonna, Minn.
Klee Co., Geo. B., Cincinnati, O.
● Lau Blower Co., Dayton, O.
Leslie Welding Co., Chicago, Ill.
Lockjoint Wood Products Co., Wichita, Kans. (Wood; stationary door, wall, window and ceiling)
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Meyer Mfg. Co., Detroit, Mich.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
Nationalaire Corp., Detroit, Mich.
Nelson Corp., Herman, Moline, Ill.
Peerless Electric Co., Warren, O.
Reed Unit-Fans, Inc., New Orleans, La.
Richmond Fireproof Door Co., Richmond, Ind.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Schoedinger, F. O., Columbus, O.
Shallcross Controls, Inc., Milwaukee, Wis.
Signal Electric Mfg. Co., Menominee, Mich.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
● Standard Stamping & Perforating Co., Chicago, Ill.
Swartwout Co., Cleveland, O.
● Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Victor Electric Products, Inc., Cincinnati, O.
● Waterloo Register Sales Co., Waterloo, Ia.

LOW WATER CUT-OFFS

See Cut-Offs, Low Water, Heating Boiler

MACHINES, BALANCING

See Equipment, Balancing

MACHINES, BLUE PRINT AND WHITE PRINT

For Reproducing Engineering Drawings

American Photocopy Equipment Co., Chicago, Ill.
Bruning Co., Inc., Charles, Long Island City, N. Y.
Dietzgen Co., Eugene, Chicago, Ill.
Ozalid Products Div., General Aniline & Film Corp., Johnson City, N. Y.
Paragon-Revolute Corp., Rochester, N. Y.
Pease Co., C. F., The, Chicago, Ill.
Peck & Harvey, Chicago, Ill.
Wickes Brothers, Saginaw, Mich.

MACHINES AND FILM, X-RAY

Eastman Kodak Co., Rochester, N. Y.
Kelly-Koet, Covington, Ky.
North American Philips Co., Inc., New York, N. Y.
Westinghouse Electric Corp., X-Ray Div., Baltimore, Md.

MACHINES, PIPE CLEANING

Spartan Tool Co., Chicago, Ill.

MACHINES, PIPE CUTTING AND THREADING, PORTABLE

Air Reduction Sales Co., New York, N. Y. (Cutting and beveling)
Beaver Pipe Tools, Inc., Warren, O.
Curtis & Curtis Co., The, Bridgeport, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Linde Air Products Co., The, New York, N. Y. (Cutting and beveling)
National Machine Works, Chicago, Ill.
Nye Tool & Machine Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
● Ridge Tool Co., Elyria, O. (Hand)
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PIPE CUTTING AND THREADING, STATIONARY

Bignall & Keeler Machine Wks., Edwardsville, Ill.
Curtis & Curtis Co., The, Bridgeport, Conn.
Jarecki Mfg. Co., Erie, Pa.
Landis Machine Co., Inc., Waynesboro, Pa.
● Obear, E. L., Los Angeles, Calif.
Oster Mfg. Co., Cleveland, O.
Pines Engineering Co., Inc., Aurora, Ill.
Saunders Machine & Tool Corp., Yonkers, N. Y.
Toledo Pipe Threading Machine Co., Toledo, O.
Wallace Supplies Mfg. Co., Chicago, Ill.

MACHINES, PITTSBURGH LOCK FORMING

Dahlstrom Machine Works, Chicago, Ill.
Lockformer Co., Chicago, Ill.
Maplewood Machinery Co., Inc., Chicago, Ill.
Rafter Machine Co., Inc., Belleville, N. J.
Whitney Metal Tool Co., Rockford, N. J.

MACHINES, REFRIGERATION, ABSORPTION

Vogt Machine Co., Henry, Louisville, Ky.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
● Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

MACHINES, TESTING, WELD

Air Reduction Sales Co., New York, N. Y.

MACHINES, VERTICAL, THREADING AND BORING

Bullard Co., The, Bridgeport, Conn.

MAGNESIUM ALLOY SHEETS

See Sheets, Magnesium Alloy

MAGNESIUM PIPE

See Pipe, Magnesium

MAGNESIUM TUBING

See Tubing, Magnesium

MALLEABLE UNIONS

See Unions, Malleable

MANIFOLDS, REFRIGERATION

Ball Welding Works, San Francisco, Calif.
Doyle & Roth Mfg. Co., Newark, N. J.
Frick Co., Waynesboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
● Mueller Brass Co., Port Huron, Mich.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Superior Valve and Fittings Co., Pittsburgh, Pa.
Swan Engineering Co., Inc., Bloomfield, N. J.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Weatherhead Co., Cleveland, O.
York Corp., York, Pa.

MANOMETERS

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barton Instrument Co., Los Angeles, Calif.
Brown Instrument Co., Div. of Minneapolis Honeywell Regulator Co., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Builders-Providence Co., Div. of Builders Iron Foundry, Providence, R. I.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Hays Corp., Michigan City, Ind.
Hill, E. Vernon, Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Wallace & Tiernan Co., Inc., Newark, N. J.

MECHANICAL DRIVE TURBINES

See Turbines, Mechanical Drive

MECHANICAL SPEED CHANGERS

See Changers, Speed, Mechanical

MECHANICAL TRAPS

See Traps, Steam, Mechanical

MERCURY SWITCHES

See Switches, Mercury

METAL HOSE

See Hose, Metal and Fittings

METAL, POROUS, FOR FILTRATION, SEPARATION, DIFFUSION AND FLOW CONTROL

Keystone Carbon Co., Inc., St. Marys, Pa.
Moraine Products Div., General Motors Corp., Dayton, O.

METALLIC BELLOWS

See Bellows, Thermostatic and Metallic

METALLIC PACKING

See Packing, Metallic

METERS, AIR VELOCITY, DIRECT READING

Detroit Air Conditioning Service Co., Detroit, Mich.
Hays Corp., Michigan City, Ind.
● Illinois Testing Laboratories, Inc., Chicago, Ill.
● Taylor Instrument Companies, Rochester, N. Y.

METERS, CONDENSATION

American District Steam Co., North Tonawanda, N. Y.
Buffalo Meter Co., Buffalo, N. Y.
Central Station Steam Co., Detroit, Mich.
Neptune Meter Co., New York, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.

METERS, FLOW, REFRIGERANT

Bristol Co., Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Hays Corp., Michigan City, Ind.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Trimount Instrument Co., Chicago, Ill.

METERS, FLOW, STEAM

American District Steam Co., North Tonawanda, N. Y.
American Meter Co., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Co., Los Angeles, Calif.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.

METERS, PROCESS LIQUID

American Meter Co., Inc., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Co., Los Angeles, Calif.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Republic Flow Meters Co., Chicago, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Philadelphia, Pa.
● Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Worthington-Gamon Meter Co., Harrison, N. J.

METERS, VOLUME, AIR AND GAS

American Meter Co., Inc., New York, N. Y.
Bristol Co., The, Waterbury, Conn.
Fischer & Porter Co., Hatboro, Pa.
Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Philadelphia, Pa.
Selas Corp. of America, Philadelphia, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.

METERS, WATER

Bailey Meter Co., Cleveland, O.
Barton Instrument Co., Los Angeles, Calif.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Hersey Mfg. Co., South Boston, Mass.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
National Meter Co., Brooklyn, N. Y.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pfening Co., Fred D., Columbus, O. (batch measuring)
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Republic Flow Meters Co., Chicago, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Philadelphia, Pa.
Union Water Meter Co., Worcester, Mass.
Worthington-Gamon Meter Co., Harrison, N. J.

MIXING VALVES

See Valves, Mixing, Steam and Water

MODULATING VALVES

See Valves, Radiator, Steam and Hot Water Modulating

MOTOR BASES

See Bases and Pads, Vibration Isolating; Bases, Motor Tension Adjusting

MOTOR CONTROLLERS

See Controllers and Starters, Motor

MOTOR OPERATED VALVES

See Valves, Motor Operated

MOTOR STARTERS

See Controllers and Starters, Motor

MOTORS, ELECTRIC, FRACTIONAL HP

● Alliance Mfg. Co., Alliance, O. (Shaded pole)
Ampex Electric Corp., San Carlos, Calif.
Baldor Electric Co., St. Louis, Mo.
Barber-Colman Co., Rockford, Ill.
Bodine Electric Co., Chicago, Ill.
Brown-Brockmeyer Co., Dayton, O.
Burke Electric Co., Erie, Pa.
Canatsey Electric Mfg. Co., Kansas City, Mo.
Century Electric Co., St. Louis, Mo.
Crise Mfg. Co., The, Columbus, O.
Dayton Acme Co., Cincinnati, O.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fairbanks, Morse & Co., Chicago, Ill.

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General Electric Co., Apparatus Dept., Schenectady, N. Y.
• Hansen Mfg. Co., Inc., Princeton, Ind.
Holtzer-Cabot, Div. First Industrial Corp., Boston, Mass.
Howell Electric Motors Co., Howell, Mich.
Jack & Heints Precision Industries, Inc., Cleveland, O.
Janette Mfg. Co., Chicago, Ill.
Leland Electric Co., Dayton, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Master Electric Co., Dayton, O.
Moore Co., The, Kansas City, Mo. (Slow speed fan motors)
Ohio Electric Mfg. Co., Cleveland, O.
Peerless Electric Co., Warren, O.
Piqua Machine & Mfg. Co., Piqua, O.
Redmond Co., Inc., Owosso, Mich.
Reynolds Electric Co., Chicago, Ill.
Robbins & Myers, Inc., Springfield, O.
Rotor Corp., Miamisburg, O.
Russell Electric Co., Chicago, Ill.
Sawyer Electrical Mfg. Co., Los Angeles, Calif.
Signal Electric Mfg. Co., Menominee, Mich.
Smith Mfg. Co., Inc., F. A., Rochester, N. Y.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Standard Electric, Div. of Standard Dayton Corp., Dayton, O.
Standard Motor Corp., Elyria, O.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Victor Electric Products, Inc., Cincinnati, O.
• Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., East Pittsburgh, Pa.

MOTORS, ELECTRIC, 1 HP AND OVER

Allis Co., Louis, The, Milwaukee, Wis.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldor Electric Co., St. Louis, Mo.
Bogue Electric Co., Paterson, N. J.
Brown-Brockmeyer Co., Dayton, O.
Burke Electric Co., Erie, Pa.
Byron Jackson Co., Los Angeles, Calif. (Submersible)
Century Electric Co., St. Louis, Mo.
Continental Electric Co., Inc., Newark, N. J.
Crocker-Wheeler Elec. Mfg. Co., Div., Joshua Hendy Iron Works, Ampere, N. J.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fairbanks, Morse & Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hertner Electric Co., Inc., Cleveland, O.
Howell Electric Motors Co., Howell, Mich.
Ideal Electric & Mfg. Co., Mansfield, O.
Imperial Electric Co., Akron, O.
Jackson Co., Byron, Los Angeles, Calif. (Submersible)
Janette Mfg. Co., Chicago, Ill.
Leland Electric Co., Dayton, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Master Electric Co., Dayton, O.
Moore Co., The, Kansas City, Mo. (slow speed fan motors)
Peerless Electric Co., Warren, O.
Philadelphia Gear Works, Inc., Philadelphia, Pa. (Geared)
Reliance Electric & Engineering Co., Cleveland, O.
Robbins & Myers, Inc., Springfield, O.
Sawyer Electrical Mfg. Co., Los Angeles, Calif.
Standard Electric, Div. of Standard Dayton Corp., Dayton, O.
Star Electric Motor Co., Bloomfield, N. J.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
• Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., East Pittsburgh, Pa.

MUSHROOM VENTILATORS

See Ventilators, Mushroom

NEEDLE BEARINGS

See Bearings, Needle

NEEDLE VALVES

See Valves, Needle

NEUTRALIZERS, ACID

See Dehydrant and Acid Neutralizer

NEUTRALIZERS, ODOR

See Adsorbers, Odor

NICKEL AND NICKEL ALLOY PIPE AND FITTINGS

See Tubing, Nickel and Alloy; Fittings, Pipe, Nickel and Nickel Alloy; Pipe, Nickel and Nickel Alloy

NICKEL AND NICKEL ALLOY SHEETS

See Sheets, Nickel and Nickel Alloy

NIPPLES, PIPE, BRASS AND COPPER

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nipple Mfg. Co., Chicago, Ill.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Crane Co., Chicago, Ill.
Downs-Smith Brass & Copper Co., New York, N. Y.
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
• Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Sales & Co., Murray W., Detroit, Mich.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Weatherhead Co., Cleveland, O.

NIPPLES, PIPE, IRON AND STEEL

Alabama Pipe Co., Anniston, Ala. (Cast iron)
Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Chicago Nipple Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Colonial Alloys Co., Metals Div., Philadelphia, Pa. (Stainless)
• Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa. (Swage)
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Illinois Malleable Iron Co., Chicago, Ill.
Larkin Packer Co., St. Louis, Mo.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Sales & Co., Murray W., Detroit, Mich.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
• Youngstown Sheet & Tube Co., Youngstown, O.

NIPPLES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., Hillside, N. J.
International Nickel Co., Inc., The, New York, N. Y.

NIPPLES, RADIATOR, SLIP

Plumb Mfg. Co., Utica, N. Y.

NOISE ELIMINATORS

See Bases and Pads, Vibration Isolating; Hose, Metal and Fittings; Insulation, Sound Deadening

NOZZLES, ATOMIZING

Bahnson Co., Winston-Salem, N. C.
Benjamin Air Rifle Co., St. Louis, Mo.
Delavan Engineering Co., Des Moines, Ia.
Marley Co., Inc., The, Kansas City, Mo.
• Martocello & Co., Jos. A., Philadelphia, Pa.
Ross Sprinkler Co., Pasadena, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Somerville, Mass.
• Spraying Systems Co., Chicago, Ill.
Steamaire Co., Cincinnati, O.
Supreme Electric Products Corp., Rochester, N. Y.

NOZZLES, FLOODING

Marley Co., Inc., The, Kansas City, Mo.

NOZZLES, SPARGER, FOR TANK HEATING

Schutte & Koerting Co., Philadelphia, Pa.

NOZZLES, SPRAY

American Cooling Tower Co., Kansas City, Mo.
American Molded Products Co., Chicago, Ill.
April Showers Co., Washington, D. C.
Bahnson Co., Winston-Salem, N. C.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Bayley Blower Co., Milwaukee, Wis.
Benjamin Air Rifle Co., St. Louis, Mo.
Binks Mfg. Co., Chicago, Ill.
Black Mfg. Co., The, Baltimore, Md.
Blower Application Co., Milwaukee, Wis.
• Buffalo Forge Co., Buffalo, N. Y.
Chain Belt Co., Milwaukee, Wis.
• Clarage Fan Co., Kalamazoo, Mich.
Delavan Engineering Co., Des Moines, Ia.
Dustlix Corp., Milwaukee, Wis.
Eclipse Air Brush Co., Inc., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Fluor Corp., Ltd., The, Los Angeles, Calif.
International Moistening Co., Providence, R. I.
Link-Belt Co., Chicago, Ill.
Marley Co., Inc., The, Kansas City, Kans.
• Martocello & Co., Jos. A., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
Parks-Cramer Co., Fitchburg, Mass.
Phillips Cooling Tower Co., Inc., New York, N. Y.
Plummer Spray Equipment Co., Napoleon, O.
• Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Rega Mfg. Co., Rochester, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Ross Sprinkler Co., Pasadena, Calif.

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Schutte & Koerting Co., Philadelphia, Pa.
Skinner Irrigation Co., Troy, O.
Spray Engineering Co., Somerville, Mass.
● Spraying Systems Co., Chicago, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Supreme Electric Products Corp., Rochester, N. Y.
Thermal Industries, Indio, Calif.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
● Yarnall-Waring Co., Philadelphia, Pa.

NUTS, LOCK

Buffalo Bolt Co., North Tonawanda, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
● Crane Co., Chicago, Ill.
Dzus Fastener Co., Inc., Babylon, N. Y.
Elastic Stop Nut Corp. of America, Union, N. J.
● Grinnell Co., Inc., Providence, R. I.
Industrial Screw Co., Chicago, Ill.
Kwikon Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Locknut Corp. of America, Chicago, Ill.
MacLean-Fogg Lock Nut Co., Chicago, Ill.
Malleable Iron Fittings Co., Branford, Conn.
Palnut Co., Irvington, N. J.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
SKF Industries, Inc., Philadelphia, Pa.
Shakeproof, Inc., Chicago, Ill. (Lock washers)
Standard Pressed Steel Co., Jenkintown, Pa.
● Tinnerman Products, Inc., Cleveland, O.
● Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

OBSERVATION BOILER PORTS

See Ports, Observation, Boiler

ODOR ADSORBERS

See Filters, Air; Adsorbers, Odor

ODOR NEUTRALIZERS

See Adsorbers, Odor; Compounds, Air Freshening

OIL BURNERS

See Burners, Oil

OIL COOLERS

See Coolers, Oil

OIL FIRED UNIT HEATERS

See Heaters, Unit, Oil Fired

OIL SEPARATORS

See Separators, Steam and Oil

OPEN END WRENCHES

See Wrenches, Open End

OPERATORS, DAMPER, DUCT

Arens Controls, Inc., Chicago, Ill.
● Autempco Corp., New York, N. Y.
● Automatic Products Co., Milwaukee, Wis.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cook Electric Co., Chicago, Ill.
● Fulton Sylphon Co., Knoxville, Tenn.
● General Controls Co., Glendale, Calif.
Hotstream Heater Co., Cleveland, O.
● Johnson Service Co., Milwaukee, Wis.
● Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
● Mercoid Corp., The, Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Perfex Corp., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Young Regulator Co., Cleveland, O.

OPERATORS, VALVE

● Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Foxboro Co., Foxboro, Mass.
● Fulton Sylphon Co., Knoxville, Tenn.
● General Controls Co., Glendale, Calif.
Grove Regulator Co., Oakland, Calif.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
● Johnson Service Co., Milwaukee, Wis.
● Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
● McDonnell & Miller, Inc., Chicago, Ill.
● McIntyre Co., The, Newton, Mass.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Perfex Corp., Milwaukee, Wis.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.

ORIFICE FLANGES

See Flanges, Orifice

ORIFICE UNIONS

See Unions, Orifice

ORIFICES, RADIATOR

Armstrong Heat Control Co., Portland, Ore.
● Autempco Corp., New York, N. Y.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
● Dunham Co., C. A., Chicago, Ill.
● Haines & Co., William S., Philadelphia, Pa.
● Illinois Engineering Co., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
New York Air Valve Corp., New York, N. Y.
● Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sterling, Inc., Milwaukee, Wis.
● Tallmadge & Co., Webster, East Orange, N. J.
● Thrush & Co., H. A., Peru, Ind.
● Webster Tallmadge & Co., East Orange, N. J.

OXY-ACETYLENE WELDING

See Welding and Cutting Apparatus, Oxy-Acetylene

OXYGEN RECORDERS

See Recorders, Oxygen

OZONE APPARATUS

A & J Co., Chicago, Ill.
Automatic Pump & Softener Corp., Rockford, Ill.
● Chelsea Products, Inc., Irvington, N. J.
Coroaire Heater Corp., The, Cleveland, O.
Electroaire Corp., Chicago, Ill.
General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
Norwood Filtration Co., The, Florence, Mass.
Ozone Air Co., Grand Rapids, Mich.
Ozone Processes, Inc., Philadelphia, Pa.
Sealkote Corp., Chicago, Ill.
United States Ozone Co. of America, Scottdale, Pa.

PACKAGED HEAT PUMP UNITS

See Units, Air Conditioning, Reverse Refrigeration Cycle

PACKAGED STEAM GENERATORS

See Boilers, Steam Generating Units, Heating and Process

PACKING, ASBESTOS

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Specialty Mfg. Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felt Products Mfg. Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Goodyear Tire & Rubber Co., Akron, O.
● Grant Wilson, Inc., Chicago, Ill.
Greene, Tweed & Co., New York, N. Y.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Klingerit, Inc., New York, N. Y. (Sheet and rod)
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Sall Mountain Co., Chicago, Ill.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.
● Wilson, Inc., Grant, Chicago, Ill.

PACKING, FIBER

Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Darcoid Co., Inc., New York, N. Y.

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Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa.
Garlock Packing Co., Palmyra, N. Y.
Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.

PACKING, LEATHER

Alexander Bros., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Chicago Belting Co., Chicago, Ill.
Davies & Co., Wayne, Westboro, Mass.
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.
Wayne Davies & Co., Worcester, Mass.
Williams & Son, I. B., Dover, N. H.

PACKING, METALLIC

Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill.
France Packing Co., Tacony, Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Hound Packing Co., Chicago, Ill.
Johns-Manville, New York, N. Y.
Klingerit, Inc., New York, N. Y. (Sheet & rod)
Linear Incorporated, Philadelphia, Pa.
McQuay-Norris Mfg. Co., St. Louis, Mo.
National Engineering Products, Inc., Washington, D. C.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.

PACKING, RUBBER AND SYNTHETIC

Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Boston Woven Hose & Rubber Co., Boston, Mass.
Chicago Belting Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Dow Corning Corp., Midland, Mich.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Graton & Knight Co., Worcester, Mass.
Greene, Tweed & Co., New York, N. Y.
Hamilton Rubber Mfg. Co., Trenton, N. J.
Houghton & Co., E. F., Philadelphia, Pa.
Johns-Manville, New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Linear Incorporated, Philadelphia, Pa.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Plant Rubber & Asbestos Works, San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.

PANELS, PERFORATED, FOR AIR DIFFUSION

• Pyle-National Co., The, Chicago, Ill.

PARTS FOR HEATING AND AIR CONDITIONING EQUIPMENT

Ackermann Mfg. Co., Wheeling, W. Va.
American Welding & Mfg. Co., Warren, O.
Carey Mfg. Co., Philip, Cincinnati, O. (Insulating panel for housing and duct construction)
• Commercial Shearing & Stamping Co., Youngstown, O. (Tank heads and bottoms, water heater legs, furnace stampings, etc.)
Detroit Stamping Co., Detroit, Mich.
Geuder, Paeschke & Frey Co., Milwaukee, Wis.
Hartwell Engineering Co., Los Angeles, Calif. (Numerous production parts, door latches, etc.)
Lindsay Corp., The, Melrose Park, Ill. (Cabinet construction for air conditioning and warm air heating equipment)
• Mueller Brass Co., Port Huron, Mich. (Specially fabricated copper tubing, machine formed tubes)
Rigid-Tex Corp., Buffalo, N. Y.

PILLOW BLOCK BEARINGS

See Bearings, Pillow Block

PILOT LIGHTS

See Lights, Pilot and Signal

PIPE, ALUMINUM

Colonial Alloy Co., Metals Div., Philadelphia, Pa.
• Revere Copper & Brass, Inc., New York, N. Y.

PIPE, ASBESTOS FIBER AND CEMENT

Johns-Manville, New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Ruberoid Co., New York, N. Y.
Union Asbestos & Rubber Co., Cicero, Ill.
United States Stoneware Co., New York, N. Y.

PIPE BENDERS

See Benders, Pipe

PIPE, BRASS AND COPPER

• American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Hussey & Co., C. G., Pittsburgh, Pa.
• Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
• Mueller Brass Co., Port Huron, Mich.
• Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., New York, N. Y.
• Revere Copper and Brass, Incorporated, New York, N. Y.
• Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

PIPE, CAST IRON, PRESSURE, BELL AND SPIGOT

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Central Foundry Co., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
U. S. Pipe & Fdry. Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, PRESSURE, FLANGED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Central Foundry Co., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
U. S. Pipe & Fdry. Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, THREADED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Somerville Iron Wks., Somerville, N. J.
U. S. Pipe & Fdry. Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE CLEANING COMPOUNDS

See Compounds, Cleaning, Pipe Coil and Condenser

PIPE COILS

See Coils, Pipe

PIPE COUPLINGS

See Couplings, Pipe

PIPE COVERING ADHESIVES

See Adhesives, for Pipe Covering

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

PIPE CUTTERS
See Cutters

PIPE CUTTING MACHINES
See Machines, Pipe Cutting and Threading

PIPE EXTRACTORS
See Extractors, Pipe

PIPE, FIBER
Brown Co., New York, N. Y.
Fibre Conduit Co., Orangeburg, N. Y.

PIPE FITTINGS
See Fittings, Pipe

PIPE FLANGES
See Flanges, Pipe

PIPE, GLASS
Corning Glass Wks, Corning, N. Y.
Fischer & Porter Co., Hatboro, Pa.

PIPE HANGERS
See Hangers and Supports, Pipe

PIPE, HARD RUBBER
American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Stokes Molded Products, Trenton, N. J.
United States Rubber Co., New York, N. Y.

PIPE INSULATION
See Insulation, Pipe

PIPE INSULATION ADHESIVES
See Adhesives, for Pipe Covering

PIPE, JACKETED
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Kaiser Co., E. B., Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Nooter Boiler Works, John, St. Louis, Mo.
Parks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Shaw-Kendall Engineering Co., Toledo, O.

PIPE JOINT COMPOUNDS
See Cement and Compounds, Pipe Joint

PIPE, LINED
American Cast Iron Pipe Co., Birmingham, Ala. (Cement)
American Hard Rubber Co., New York, N. Y. (Rubber)
● American Rolling Mill Co., The, Middletown, O.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Bridgeport Brass Co., Bridgeport, Conn.
Cement Lined Pipe Co., Lynn, Mass.
Clow & Sons, James B., Chicago, Ill.
Cohoes Rolling Mill Co., Cohoes, N. Y. (Cement)
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
General Plate Div., Metals & Controls Corp., Attleboro, Mass. (Silver lined)
Goodrich Co., B. F., Akron, O. (Rubber-lined)
Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Cement)
Kaiser Co., E. B., Chicago, Ill.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Michigan Pipe Co., Bay City, Mich., (Wood)
National Lead Co., New York, N. Y. (Lead)
Nooter Boiler Works, John, St. Louis, Mo.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
Smith Corp., A. O., Milwaukee, Wis.
United States Rubber Co., New York, N. Y. (Rubber)
United States Stoneware Co., New York, N. Y.
Vesco Corp., New York, N. Y. (Enamel)
Warren Foundry & Pipe Corp., New York, N. Y. (Cement-bituminous enamel)
● Youngstown Sheet & Tube Co., Youngstown, O.

PIPE LINE STRAINERS
See Strainers, Pipe Line

PIPE, MAGNESIUM
● Revere Copper and Brass, Inc., New York, N. Y.

PIPE, NICKEL AND NICKEL ALLOY
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Globe Steel Tubes Co., Milwaukee, Wis.
International Nickel Co., New York, N. Y.
● Revere Copper and Brass, Incorporated, New York, N. Y.

PIPE NIPPLES
See Nipples, Pipe

PIPE, PLASTIC
Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
Amerform Corp., Philadelphia, Pa.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Del.
● Durant Insulated Pipe Co., East Palo Alto, Calif.
Extruded Plastics, Inc., Norwalk, Conn.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.

PIPE, PRE-INSULATED
Baldwin-Hill Co., Trenton, N. J.
● Durant Insulated Pipe Co., East Palo Alto, Calif.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Kaiser Co., E. B., Chicago, Ill.
● Ric-wiL Co., Cleveland, O.

PIPE REAMERS
See Reamers, Pipe

PIPE REPAIR CLAMPS
See Clamps, Pipe Repair

PIPE, SPIRAL, RIVETED AND WELDED
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Columbian Steel Tank Co., Kansas City, Mo.
● Naylor Pipe Co., Chicago, Ill.
● Revere Copper and Brass, Incorporated, New York, N. Y.
● Taylor Forge & Pipe Wks., Chicago, Ill.

PIPE, STEEL, BUTT AND LAP WELDED
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
● Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Chicago Metal Mfg. Co., Chicago, Ill.
Fretz-Moon Tube Co., Butler, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Tube Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Semet-Solvay Engineering Corp., New York, N. Y. (Specially fabricated)
South Chester Tube Co., Chester, Pa.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Tippett & Wood, Phillipsburg, N. J. (12 in. and larger)
● Wheatland Tube Co., Philadelphia, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
● Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, SEAMLESS
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Reading Tube Corp., New York, N. Y.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.
● Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, STAINLESS
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Locomotive Co., Alco Products Div., New York, N. Y.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
● Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.

PIPE, STONEWARE
General Ceramics Co., Keasbey, N. J.
Knight, Maurice A., Akron, O. (Stoneware)
United States Stoneware Co., New York, N. Y. (Stoneware)

PIPE SUPPORTS
See Hangers and Supports, Pipe

PIPE TONGS
See Tongs, Pipe

PIPE, TUBING, FITTINGS AND VALVES, CARBON AND GRAPHITE
National Carbon Co., New York, N. Y.

PIPE AND TUBING, LEAD AND LEAD ALLOY
Alpha Metals, Inc., Brooklyn, N. Y.
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Gardiner Metal Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.

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National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Works, Inc., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
United States Stoneware Co., New York, N. Y.

PIPE VISES

See Vises, Pipe

PIPE, WOOD

American District Steam Co., North Tonawanda, N. Y.
Caldwell Co., W. E., Louisville, Ky.
Michigan Pipe Co., Bay City, Mich.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE WRENCHES

See Wrenches, Pipe

PIPE, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.

PISTON RINGS

See Rings, Piston

PITOT TUBES

See Tubes, Pitot

PITTSBURGH LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

PLASTIC PIPE AND PIPE FITTINGS

See Pipe, Plastic; Fittings, Pipe, Plastic

PLASTIC TUBING

See Tubing, Plastic

PLATES, FLOOR AND CEILING

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Grabler Mfg. Co., Cleveland, O.
● Grinnell Co., Inc., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Jarecki Mfg. Co., Erie, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keeney Mfg. Co., Newington, Conn.
Little Mfg. Co., M. S., Hartford, Conn.
Russell Mfg. Co., John M., Naugatuck, Conn.
● Walworth Co., New York, N. Y.

PLUG COCKS

See Valves, Plug

PLUG VALVES

See Valves, Plug

PLUGS, FUSIBLE, BOILER

Chicago Specialty Mfg. Co., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
● Walworth Co., New York, N. Y.

PLUGS, REPAIR, FOR TANKS

Rolyan Metal Products, Chicago, Ill.

POROUS METAL

See Metal, Porous

PORTS, OBSERVATION, BOILER

Chicago Fire Brick Co., Chicago, Ill.
Detroit Stoker Co., Detroit, Mich.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ramite Co., The, Chicago, Ill.
Sims Co., Erie, Pa.

POSITIONERS, WELDING

See Welding and Cutting Apparatus, Oxy-Acetylene

POWER SHEARS

See Shears, Power

PREHEATERS, FUEL OIL

American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Engineer Co., New York, N. Y.
Falcon Equipment Co., New Brighton, Pa.
Frank Heaters, Inc., Paterson, N. J.
● General Fittings Co., Providence, R. I.
Griscom-Russell Co., New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Hynes Electric Heating Co., Camden, N. J.
Industrial Engineering & Equipment Co., St. Louis, Mo. (Electric)
● Johnson Corp., Three Rivers, Mich.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Oil Heat Master National Sales, New York, N. Y.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
● Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Semet-Solvay Engineering Corp., New York, N. Y.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Staples & Pfeiffer, San Francisco, Calif.
Struthers Wells Corp., Titusville, Pa.
Taco Heaters, Inc., New York, N. Y.
● Thrush & Co., H. A., Peru, Ind.
Todd Shipyards Corp. Combustion Equipment Div., New York, N. Y.
Trent Co., Harold E., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Warren Electric Appliance Co., Warren, Pa.
● Whitlock Mfg. Co., Hartford, Conn.
● Wiegand Co., Edwin L., Pittsburgh, Pa. (Electric)

PREHEATERS AND STRESS RELIEVERS, ELECTRIC, FOR PIPE WELDS

Electric Arc, Inc., Newark, N. J.
Falcon Equipment Co., New Brighton, Pa.
Hynes Electric Heating Co., Camden, N. J.
Trent Co., Harold E., Philadelphia, Pa.

PRE-INSULATED PIPE

See Pipe, Pre-Insulated

PRESSURE BLOWERS

See Blowers, High Pressure

PRESSURE CONTROLLERS

See Regulators, Pressure

PRESSURE GAGES

See Gages, Indicating, Pressure

PRESSURE INDICATOR-CONTROLLERS

See Indicator-Controllers, Pressure

PRESSURE RECORDER-CONTROLLERS

See Recorder-Controllers, Pressure

PRESSURE RECORDERS

See Recorders, Pressure and Vacuum

PRESSURE REDUCING VALVES

See Valves, Pressure Reducing and Regulating

PRESSURE REGULATING VALVES

See Valves, Pressure Reducing and Regulating

PRESSURE REGULATORS

See Regulators, Pressure

PRESSURE SWITCHES

See Switches, Pressure and Vacuum

PROCESS HEATING SYSTEMS

See Systems, Process Heating, High Temperature

PROCESS STEAM SUPERHEATERS

See Superheaters, Process Steam

PROCESS AND STORAGE TANKS

See Tanks, Process and Storage

PROPELLER FANS

See Fans, Propeller

PROPELLER PUMPS

See Pumps, Propeller

PROPORTIONING PUMPS

See Pumps, Proportioning

PROTECTIVE COATINGS

See Coatings, Protective, for Metal

PROTECTORS, PIPE COVERING

American District Steam Co., North Tonawanda, N. Y.
Carpenter & Paterson, Inc., East Boston, Mass.
Cinder Products Corp., Providence, R. I.
● Grinnell Co., Inc., Providence, R. I.
● Ricwil Co., Cleveland, O.

PSYCHROMETERS, SLING AND HAND ASPIRATED

American Moistening Co., Providence, R. I.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
General Scientific Equipment Co., Philadelphia, Pa.
● Grinnell Co., Inc., Providence, R. I.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon, Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Co., Cincinnati (Norwood), O.
Parks-Cramer Co., Fitchburg, Mass.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.

PSYCHROSTATS

See Humidistats

PULLEYS AND SHEAVES, FOR BELT DRIVES

● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Browning Mfg. Co., Inc., Maysville, Ky.
Congress Die Casting Div., Congress Tool & Die Co., Detroit, Mich.
Dayton Rubber Mfg. Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J. (Steel split)
Doall Co., The, Des Plaines, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga. (Cast iron)
Lovejoy Flexible Coupling Co., Chicago, Ill.
● Lau Blower Co., Dayton, O.
Lewellen Mfg. Co., Columbus, Ind.
Maurey Mfg. Corp., Chicago, Ill. (v-belt steel and cast iron)
Pyott Foundry & Machine Co., Chicago, Ill.
Rockwood Mfg. Co., Indianapolis, Ind.
● Scientiae Tool Co., Dayton, O. (variable pitch)
Swift Mfg. Co., Inc., Detroit, Mich. (Cast iron)
Thermoid Rubber, Div. of Thermoid Co., Trenton, N. J.
Utility Appliance Corp., Los Angeles, Calif.
Webster Electric Co., Racine, Wis.
Wood's Sons Co., T. B., Chambersburg, Pa.
● Worthington Pump & Machinery Corp., Harrison, N. J. (v-type)

PULVERIZED COAL BURNERS

See Burners, Pulverized Coal

PUMP BASES

See Bases and Pads, Vibration Isolating

PUMP VALVES

See Valves, Pump

PUMPS, BOILER FEED

Acker Organization, Inc., W. M., Cleveland, O.
Aldrich Pump Co., Allentown, Pa.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Aurora Pump Co., Aurora, Ill.
Austin-Mason Co., New York, N. Y.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Buffalo Pumps, Inc., Buffalo, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., W. M., Louisville, Ky.
Columbus Steam Pump Wks., Co., Columbus, O.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
Dayton-Dowd Co., Quincy, Ill.
● Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
● Decatur Pump Co., Decatur, Ill.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
● Eagan Co., Walter H., Philadelphia, Pa.
Eclipse Fuel Engineering Co., Rockford, Ill.
Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Works, Inc., Brooklyn, N. Y.
Foster Wheeler Corp., New York, N. Y.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
● Johnson Corp., Three Rivers, Mich.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
● McDonnell & Miller, Inc., Chicago, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Morris Machine Works, Baldwinsville, N. Y.
● Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Oberdorfer Industries, Inc., Syracuse, N. Y.
Pacific Pumps, Inc., Huntington Park, Calif.
● Peerless Pumps Div., Food Machinery Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Robbins & Myers, Inc., Springfield, O.
● Schaub Engineering Co., Fred H., Chicago, Ill.
Sellers Engineering Co., Chicago, Ill.
Skidmore Corp., St. Joseph, Mich.
Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Weil Pump Co., Chicago, Ill.
Weinman Pump Mfg. Co., The, Columbus, O.
Whittington Pump & Engineering Co., Indianapolis, Ind.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CENTRIFUGAL

Aldrich Pump Co., Allentown, Pa.
Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
American Metal Products Co., Fort Worth, Tex.
American Well Wks., Aurora, Ill.
Ames Hydrovac, Inc., Brooklyn, N. Y.
Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
Barrett, Haentjens & Co., Hazleton, Pa.
Beach-Russ Co., New York, N. Y.
Beckett & Co., Thomas, Dallas, Tex.
● Bell & Gossett Co., Morton Grove, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blaisdell Compressor Co., New York, N. Y.
● Buffalo Pumps, Inc., Buffalo, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chain Belt Co., Milwaukee, Wis.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
Dayton-Dowd Co., Quincy, Ill.
● Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
● Decatur Pump Co., Decatur, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
● Dunham Co., C. A. Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
● Eagan Co., Walter H., Philadelphia, Pa.
Eastern Engineering Co., New Haven, Conn.
Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Works, Inc., Brooklyn, N. Y.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Gardner-Denver Co., Quincy, Ill.
Gorman-Rupp Co., Mansfield, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
La Bour Co., Inc., The, Elkhart, Ind.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lecourtenay Co., Newark, N. J.
Lewis & Co., Inc., Chas. S., St. Louis, Mo.
Leyman Mfg. Corp., John H., McGowan Co. Div., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Marco Co., Wilmington, Del.
Morey, Dan, Los Angeles, Calif. (recirculating for evaporative coolers)
Morris Machine Works, Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
National Carbon Co., New York, N. Y.
Oberdorfer Industries, Inc., Syracuse, N. Y.
Pacific Pumps, Inc., Huntington Park, Calif.
Palmer Electric Co., Detroit, Mich.
● Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
Ruthman Machinery Co., Cincinnati, O.
Schneible Co., Claude B., Detroit, Mich.
Schwitzer-Cummins Co., Indianapolis, Ind.
Skidmore Corp., St. Joseph, Mich.
Smith Corp., A. O., Milwaukee, Wis.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
● Trane Co., The, La Crosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Utility Appliances Corp., Los Angeles, Calif.
Warren Steam Pump Co., Inc., Warren, Mass.
Weil Pump Co., Chicago, Ill.
Weinman Pump Mfg., Co., The, Columbus, O.
Whittington Pump & Engineering Co., Indianapolis, Ind.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CONDENSATION RETURN

● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Ames Hydrovac, Inc., Brooklyn, N. Y.
Aurora Pump Co., Aurora, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Buffalo Pumps, Inc., Buffalo, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., W. M., Louisville, Ky.
Cochrane Corp., Philadelphia, Pa.
Columbus Steam Pump Wks. Co., Columbus, O.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
Dayton-Dowd Co., Quincy, Ill.

• Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
• Decatur Pump Co., Decatur, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
• Dunham Co., C. A., Chicago, Ill.
• Eagan Co., Walter H., Philadelphia, Pa.
Eastern Engineering Co., New Haven, Conn.
Eclipse Fuel Engineering Co., Rockford, Ill.
Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Works, Inc., Brooklyn, N. Y.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Heating Assurance, Inc., Spokane, Wash.
• Hoffman Specialty Co., Indianapolis, Ind.
Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
• Johnson Corp., Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Myers & Bro. Co., The F. E., Ashland, O.
• Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Oberdorfer Industries, Inc., Syracuse, N. Y.
O'Brien Steam Specialty Co., Syracuse, N. Y.
• Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
• Schaub Engineering Co., Fred H., Chicago, Ill.
Sellers Engineering Co., Chicago, Ill.
Skidmore Corp., St. Joseph, Mo.
Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
• Trane Co., The, La Crosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Weil Pump Co., Chicago, Ill.
Weinman Pump Mfg. Co., The, Columbus, O.
Whittington Pump & Engineering Co., Indianapolis, Ind.
• Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, DEEP WELL, TURBINE

American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Wks., Aurora, Ill.
Aurora Pump Co., Aurora, Ill.
Byron Jackson Co., Los Angeles, Calif.
Cook, Inc., A. D., Lawrenceburg, Ind.
Davidson Co., M. T., Brooklyn, N. Y.
• Decatur Pump Co., Decatur, Ill. (shallow well)
Deming Co., Salem, O.
• Eagan Co., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Layne & Bowler, Inc., Memphis, Tenn.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Pacific Pumps, Inc., Huntington Park, Calif.
• Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Smith Corp., A. O., Milwaukee, Wis.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, FIRE

• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
• Buffalo Pumps, Inc., Buffalo, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
Dayton-Dowd Co., Quincy, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Oberdorfer Industries, Inc., Syracuse, N. Y.
• Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Viking Pump Co., Cedar Falls, Ia.
Warren Steam Pump Co., Inc., Warren, Mass.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, LIQUID REFRIGERANT CIRCULATING

American-Marsh Pumps, Inc., Battle Creek, Mich.
Aurora Pump Co., Aurora, Ill.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Brunner Mfg. Co., Utica, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
• Eagan Co., Walter H., Philadelphia, Pa.
Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Lewis & Co., Chas. S., St. Louis, Mo.
Pacific Pumps, Inc., Huntington Park, Calif.
• Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Roper Corp., Geo. D., Rockford, Ill.
Vilter Mfg. Co., Milwaukee, Wis.
Warren Steam Pump Co., Inc., Warren, Mass.
Weinman Pump Mfg. Co., The, Columbus, O.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPELLER

Byron Jackson Co., Los Angeles, Calif.
Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Pacific Pumps, Inc., Huntington Park, Calif.
• Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Ruthman Machinery Co., Cincinnati, O.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPORTIONING

Blackburn-Smith Mfg. Co., Hoboken, N. J.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cochrane Corp., Philadelphia, Pa.
Dearborn Chemical Co., Chicago, Ill.
Marco Co., Wilmington, Del.
Nelson Chemical Pumps, Casper, Wyo.
% Proportioneers, Inc. %, Providence, R. I.
Roy Co., Milton, Philadelphia, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.

PUMPS, RECIPROCATING

Aldrich Pump Co., Allentown, Pa.
Alten's Foundry & Machine Works, Lancaster, O.
American Hard Rubber Co., New York, N. Y. (Rubber and Rubber lined)
American-Marsh Pumps, Inc., Battle Creek, Mich.
Austin-Mason Co., New York, N. Y.
Brunner Mfg. Co., Utica, N. Y.
• Buffalo Pumps, Inc., Buffalo, N. Y.
Columbus Steam Pump Wks., Columbus, O.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
• Dean Brothers Pumps, Inc., Indianapolis, Ind.
Deming Co., Salem, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Dudgeon, Inc., Richard, New York, N. Y.
Duro Co. Dayton, O.
• Eagan Co., Walter H., Philadelphia, Pa.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pumps Wks., Inc., Brooklyn, N. Y.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Ingersoll-Rand Co., New York, N. Y.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Myers & Bro. Co., F. E., The, Ashland, O.
National Steam Pump Co., Upper Sandusky, O.
Red Jacket Mfg. Co., Davenport, Ia.
Roy Co., Milton, Philadelphia, Pa.
Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
• Watson-Stillman Co., Roselle, N. J.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, ROTARY

Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
American Hard Rubber Co., New York, N. Y. (Rubber and rubber lined)
Beach-Russ Co., New York, N. Y.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Bump Pump Co., La Crosse, Wis.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
• Eagan Co., Walter H., Philadelphia, Pa.
Eastern Engineering Co., New Haven, Conn.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Jabsco Pump Co., Burbank, Calif.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Marco Co., Wilmington, Del.
● Martocello & Co., Jos. A., Philadelphia, Pa.
May Oil Burner Corp., Baltimore, Md.
● McIntyre Co., The, Newton, Mass.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
● Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Industries, Inc., Syracuse, N. Y.
● Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Polo Pump Co., Polo, Ill.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
St. Louis Tool Co., St. Louis, Mo.
Schutte & Koerting Co., Philadelphia, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sundstrand Machine Tool Co., Pump Div., Rockford, Ill.
Taber Pump Co., Buffalo, N. Y.
Trimount Rotary Power Co., East Dedham, Mass.
Tuthill Pump Co., Chicago, Ill.
Viking Pump Co., Cedar Falls, Ia.
Webster Electric Co., Racine, Wis.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yale & Towne Mfg. Co., Stamford, Conn.

PUMPS, SEWAGE AND SLUDGE

American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Works, Aurora, Ill.
Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
● Eagan Co., Walter H., Philadelphia, Pa.
Economy Pumps, Inc., Hamilton, O.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros. Inc., Richmond, Calif.
Kingsford Foundry & Machine Works, Oswego, N. Y.
● Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Swaby Mfg. Co., Chicago, Ill.
Weil Pump Co., Chicago, Ill.
Weinman Pump Mfg. Co., The, Columbus, O.
Whittington Pump & Engineering Co., Indianapolis, Ind.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, STEAM

American-Marsh Pumps, Inc., Battle Creek, Mich.
Austin-Mason Co., New York N. Y.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Columbus Steam Pump Wks. Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
● Dean Brothers Pumps, Inc., Indianapolis, Ind.
● Eagan Co., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
National Steam Pump Co., Upper Sandusky, O.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
● Watson-Stillman Co., Roselle, N. J.
● Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, SUMP

● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Aurora Pump Co., Aurora, Ill.
Austin-Mason Co., New York, N. Y.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
● Buffalo Pumps, Inc., Buffalo, N. Y.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pneumatic Tool Co., New York, N. Y.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
Dayton-Dowd Co., Quincy, Ill.
Dean Hill Pump Co., Indianapolis, Ind.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
Duro Co., Dayton, O.
● Eagan Co., Walter H., Philadelphia, Pa.
Eastern Engineering Co., New Haven, Conn.
Economy Pumps, Inc., Hamilton, O.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Gorman-Rupp Co., Mansfield, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
Jackson Co., Byron, Los Angeles, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Noera Mfg. Co., Div. Chase Brass & Copper Co., Waterbury, Conn.
● Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Penberthy Injector Co., Detroit, Mich.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
Schneible Co., Claude B., Detroit, Mich.
Schutte & Koerting Co., Philadelphia, Pa.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Wade Mfg. Co., Elgin, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.
Weil Pump Co., Chicago, Ill.
Weinman Pump Mfg. Co., The, Columbus, O.
Westco Pumps, Fairbanks, Morse & Co., St. Louis, Mo.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM

Allen Billmyre Div., Lamson Corp., Mamaroneck, N. Y.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Automatic Typewriter Co., Chicago, Ill.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Austin-Mason Co., New York, N. Y.
Beach-Russ Co., New York, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Chicago Pump Co., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Davidson Co., M. T., Brooklyn, N. Y.
● Dean Brothers Pumps, Inc., Indianapolis, Ind.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
● Dunham Co., C. A., Chicago, Ill.
● Eagan Co., Walter H., Philadelphia, Pa.
Economy Pumps, Inc., Hamilton, O.
Eisler Engineering Corp., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Foster Wheeler Corp., New York, N. Y.
Fuller Co., Catasauqua, Pa.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraisal Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
● Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
● Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Skidmore Corp., St. Joseph, Mich.
Sterling, Inc., Milwaukee, Wis.
Stokes Machine Co., F. J. Philadelphia, Pa.
Trimount Rotary Power Co., East Dedham, Mass.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Ia.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Co., Indianapolis, Ind.
● Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM HEATING

American-Marsh Pumps, Inc., Battle Creek, Mich.
Ames Hydrovac, Inc., Brooklyn, N. Y.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Domestic Engine & Pump Co., Shippensburg, Pa.
● Dunham Co., C. A., Chicago, Ill.
● Eagan Co., Walter H., Philadelphia, Pa.
Economy Pumps, Inc., Hamilton, O.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Gylstrom Co., O., Milwaukee, Wis.
● Hoffman Specialty Co., Indianapolis, Ind.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
● Nash Engineering Co., South Norwalk, Conn.
Roots-Connersville, Blower Corp., Connersville, Ind.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Skidmore Corp., St. Joseph, Mich.
Sterling, Inc., Milwaukee, Wis.
• Trane Co., The, La Crosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Whittington Pump & Engineering Co., Indianapolis, Ind.
• Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, VISCOUS LIQUIDS AND HEAVY MATERIALS

Aldrich Pump Co., Allentown, Pa.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Austin-Mason Co., New York, N. Y.
Beach-Russ Co., New York, N. Y.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
• Buffalo Pumps, Inc., Buffalo, N. Y.
Bump Pump Co., La Crosse, Wis.
Byron Jackson Co., Los Angeles, Calif.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
• Dean Brothers Pumps, Inc., Indianapolis, Ind.
• Eagan Co., Walter H., Philadelphia, Pa.
Economy Pumps, Inc., Hamilton, O.
Engineer Co., New York, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Jackson Co., Byron, Los Angeles, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Marco Co., Wilmington, Del.
Morris Machine Wks., Baldwinsville, N. Y.
Quimby Pump Div., H. K. Porter Co., Inc., Lawrenceville, Pa.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Roy Co., Milton, Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Taber Pump Co., Buffalo, N. Y.
Tuthill Pump Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Ia.
Warren Steam Pump Co., Inc., Warren, Mass.
Whittington Pump & Engineering Co., Indianapolis, Ind.
• Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUNCHES, SHEET METAL

Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Inc., Cambridge City, Ind.
Bliss Co., E. W., Detroit, Mich.
C-B Tool Co., Lancaster, Pa.
Callahan Can Machine Co., Inc., Brooklyn, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore Co., Beloit, Wis.
Henry & Wright Mfg. Co., Hartford, Conn.
International Nutyp Tool Co., Oswego, N. Y.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Perkins Machine Co., Warren, Mass.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
Service Machine Co., Elizabeth, N. J.
Swaine Mfg. Co., Fred J., St. Louis, Mo.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., Philadelphia, Pa.
Zeh & Hahnemann Co., Newark, N. J.

PURGERS, REFRIGERANT GAS

• Armstrong Machine Works, Three Rivers, Mich.
Frick Co., Waynesboro, Pa.
Mueller Brass Co., Port Huron, Mich.
Vilter Mfg. Co., Milwaukee, Wis.

PUSHERS, PIPE, HYDRAULIC

Blackhawk Mfg. Co., Milwaukee, Wis.
Dudgeon, Inc., Richard, New York, N. Y.
Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.

RADIATION BASEBOARD, FERROUS

• Burnham Boiler Corp., Irvington, N. Y.
• Crane Co., Chicago, Ill.
• Dunham Co., C. A., Chicago, Ill.

RADIATION, BASEBOARD, NON-FERROUS

Beacon-Morris Corp., Allston, Boston, Mass.
• Webster & Co., Warren, Camden, N. J.

RADIANT HEAT THERMOSTATS

See Thermostats, Radiant Heat

RADIATION, CONVECTION TYPE, FERROUS

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Brown Fintube Co., The, Elyria, O.
• Crane Co., Chicago, Ill.
• Dunham Co., C. A., Chicago, Ill.
• Marlo Coil Co., St. Louis, Mo.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
• Rittling Corp., The, Buffalo, N. Y.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
United States Radiator Corp., Detroit, Mich.
• Vulcan Radiator Co., Hartford Conn.
Weil-McLain Co., Chicago, Ill.

RADIATION, CONVECTION TYPE, NON-FERROUS

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Beacon-Morris Corp., Boston, Mass.
Brown Fintube Co., The, Elyria, O.
• Bush Mfg. Co., Hartford, Conn.
• Extended Surface, Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
G. & O. Mfg. Co., New Haven, Conn.
Kehm Corp., The, Chicago, Ill.
McQuay, Inc., Minneapolis, Minn.
Modine Mfg. Co., Racine, Wis.
• Nesbitt Inc., John J., Philadelphia, Pa.
Refrigeration Economics Co., Inc., Canton, O.
• Rittling Corp., The, Buffalo, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Super Radiator Corp., Minneapolis, Minn.
• Trane Co., The, La Crosse, Wis.
• Tuttle & Bailey, Inc., New Britain, Conn.
Vapor Car Heating Co., Inc., Chicago, Ill.
• Vulcan Radiator Co., Hartford, Conn.
• Webster & Co., Warren, Camden, N. J.
Young Radiator Co., Racine, Wis.

RADIATION, DIRECT

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
• Burnham Boiler Corp., Irvington, N. Y.
Clifford Mfg. Co., Boston, Mass. (For aircraft)
Clow & Sons, James B., Chicago, Ill. (Gas fired)
Columbus Radiator Co., McKeesport, Pa.
• Crane Co., Chicago, Ill.
Fowler & Wolfe Radiator Co., Norristown, Pa.
Kohler Co., Kohler, Wis.
• Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
• Rittling Corp., The, Buffalo, N. Y.
• Smith Co., Inc., H. B., The, Westfield, Mass. (Fin-tube type)
United States Radiator Corp., Detroit, Mich.
Utica Radiator Corp., Utica, N. Y.
Weil-McLain Co., Chicago, Ill.

RADIATOR AND CONVECTOR HUMIDIFIERS

See Humidifiers for Radiators and Convectors

RADIATOR HANGERS

See Hangers or Brackets, Radiator

RADIATOR ORIFICE VALVES

See Valves, Radiator, Orifice

RADIATOR ORIFICES

See Orifices, Radiator

RADIATOR VALVES

See Valves, Radiator

RADIATOR VENT VALVE HUMIDIFIERS

See Humidifiers, Radiator Vent Valve

RADIATORS, GAS FIRED

Automatic Gas Equipment Co., Pittsburgh, Pa.
Brown Fintube Co., The, Elyria, O.

RADIATORS, HUMIDIFYING

• Murray Mfg. Co., D. J., Wausau, Wis.

RATCHET WRENCHES

See Wrenches, Ratchet

REAMERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.

Beaver Pipe Tools, Inc., Warren, O.
Crown Die & Tool Co., Chicago, Ill.
Greenfield Tap & Die Corp., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Nye Tool & Machine Co., Chicago, Ill.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.

RECIPROCATING PUMPS

See Pumps, Reciprocating

RECORDER-CONTROLLERS, COMBINED TEMPERATURE AND HUMIDITY

Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Ess Instrument Co., Bergenfield, N. J.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore, Md.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDER-CONTROLLERS, HUMIDITY

Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore, Md.
• Gotham Instrument Co., Inc., New York, N. Y.
• Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDER-CONTROLLERS, PRESSURE

Bailey Meter Co., Cleveland, O.
Baldwin Locomotive Wks., Eddystone, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
• Gotham Instrument Co., Inc., New York, N. Y.
Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDER-CONTROLLERS, TEMPERATURE

Bailey Meter Co., Cleveland, O.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore, Md.
• Gotham Instrument Co., Inc., New York, N. Y.
• Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.

RECORDERS, CARBON DIOXIDE

Cole-Sewell Engineering Co., St. Paul, Minn.
Davis Emergency Equipment Co., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Charles, Newark, N. J.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, COMBINED TEMPERATURE AND HUMIDITY

Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
• Gotham Instrument Co., Inc., New York, N. Y.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Moeller Instrument Co., Richmond Hill, N. Y.
Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regullator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, HUMIDITY

Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
H-B Instrument Co., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Moeller Instrument Co., Richmond Hill, N. Y.
• Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDERS, LIQUID LEVEL

Bailey Meter Co., Cleveland, O.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Liquidometer Corp., Long Island City, N. Y.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Uehling Instrument Co., Paterson, N. J.
Westinghouse Electric Corp., East Pittsburgh, Pa.

RECORDERS, OXYGEN

Bailey Meter Co., Cleveland, O.
Davis Emergency Equipment Co., Newark, N. J.
Hays Corp., Michigan City, Ind.

RECORDERS, PRESSURE AND VACUUM

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Baldwin Locomotive Wks., Eddystone, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Foxboro Co., Foxboro, Mass.
• Gotham Instrument Co., Inc., New York, N. Y.
Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Moeller Instrument Co., Richmond Hill, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Barber-Colman Co., Rockford, Ill.

Boylston Steam Specialty Co., Chicago, Ill.

● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, TEMPERATURE

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Engelhard, Inc., Charles, Newark, N. J.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
● Gotham Instrument Co., Philadelphia, Pa.
H-B Instrument Co., Philadelphia, Pa.
Hays Corp., Michigan City, Ind.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
Moeller Instrument Co., Richmond Hill, N. Y.
Moore Products Co., Philadelphia, Pa.
Palmer Co., Cincinnati (Norwood), O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Precision Scientific Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.

RECORDING THERMOMETERS

See Recorders, Temperature

RECOVERY EQUIPMENT, AIR

See Adsorbers, Odor

REDUCERS, SPEED

● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Bodine Electric Co., Chicago, Ill.
Boston Gear Wks., Inc., North Quincy, Mass.
De Laval Steam Turbine Co., Trenton, N. J.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Graham Transmissions, Inc., Milwaukee, Wis.
Janette Mfg. Co., Chicago, Ill.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Link Belt Co., Philadelphia, Pa.
Medart Co., St. Louis, Mo.
Moore Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
Morse Chain Co., Ithaca, N. Y. (Chain speed)
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Poole Foundry & Machine Co., Baltimore, Md.
Smith, Inc., Winfield H., Springville, N. Y.
Star Electric Motor Co., Bloomfield, N. J.
Shallcross Controls, Inc., Milwaukee, Wis.
● Stephens-Adamson Mfg. Co., Aurora, Ill.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Westinghouse Electric Corp., East Pittsburgh, Pa.

REFRACTORIES AND REFRACTORY CEMENT

Amerform Corp., Philadelphia, Pa.
Armstrong Cork Co., Lancaster, Pa.
Babcock & Wilcox Co., New York, N. Y.
Basic Refractories, Inc., Cleveland, O.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Chicago Fire Brick Co., Chicago, Ill.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
General Insulating Products Co., Brooklyn, N. Y.
Green Fire Brick Co., A. P., Mexico, Mo.
Johns-Manville, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Clay Products Co., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Munn and Steele, Inc., Newark, N. J.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Robinson Insulation Co., Great Falls, Mont.
● Rutland Fire Clay Co., Rutland, Vt.
Saverite Engineering Co., Hoboken, N. J.
Standard Fuel Engineering Co., Detroit, Mich.
Taylor Sons Co., Charles, Cincinnati, O.
United States Stoneware Co., New York, N. Y.
Universal Zonolite Insulation Co., Chicago, Ill.
Walsh Refractories Corp., St. Louis, Mo.

REFRIGERANT DEHYDRATORS

See Dehydrators, Refrigerant

REFRIGERANT FILTERS

See Filters, Refrigerant

REFRIGERANT GAS PURGERS

See Purgers, Refrigerant Gas

REFRIGERANTS

Ansul Chemical Co., Refrigeration Div. Marinette, Wis. (methyl chloride, sulphur dioxide)
Armour Ammonia Wks., Chicago, Ill. (ammonia)
Carbide and Carbon Chemicals Corp., New York, N. Y. (Butane, isobutane, propane, ethane)
du Pont de Nemours & Co., Inc., E. I. Ammonia Dept., Wilmington, Del. (ammonia, sulphur dioxide, methyl chloride, "Freon")
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept., Wilmington, Del. (Methyl chloride and methylene chloride)
● Kinetic Chemicals, Inc., Wilmington, Del. ("Freon," fluorine)
Liquid Carbonic Corp., Chicago, Ill. (carbon dioxide)
Pennsylvania Salt Mfg. Co., Philadelphia, Pa. (ammonia)
Pure Carbonic, Inc., New York, N. Y. (carbon dioxide)
Solvay Sales Corp., New York, N. Y.
Virginia Smelting Co., West Norfolk, Va. (Methyl chloride, liquid sulphur dioxide, methylene chloride)

REFRIGERATING COMPRESSORS

See Compressors, Refrigerating

REFRIGERATION ACCUMULATORS

See Accumulators, Refrigeration

REFRIGERATION CONTROLS

See Valves, Refrigeration

REFRIGERATION FITTINGS

See Fittings, Refrigeration

REFRIGERATION MANIFOLDS

See Manifolds, Refrigeration

REFRIGERATION VALVES

See Valves, Refrigeration

REGISTERS

See also Diffusers; Grilles; Panels, Perforated, for Air Diffusion

A-J Mfg. Co., Kansas City, Mo.
Air Control Products, Inc., Coopersville, Mich.
AirO-Fin Register Co., Detroit, Mich.
● Auer Register Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Best Register Co., Milwaukee, Wis.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Diamond Mfg. Co., Wyoming, Pa.
Eaglesfield Ventilator Co., Indianapolis, Ind. (wood)
Empire Ventilation Equipment Co., Long Island City, N. Y.
Gillian Mfg. Co., Detroit, Mich.
Hart & Cooley Mfg. Co., Holland, Mich.
Independent Register Co., Cleveland, O.
Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Middleton Mfg. & Sales Co., Minneapolis, Minn.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Palmer Mfg. Corp., Phoenix, Ariz.
Register & Grille Mfg. Co., Brooklyn, N. Y.
Rock Island Register Co., Rock Island, Ill.
Smith Co., J. B., Philadelphia, Pa.
● Standard Stamping & Perforating Co., Chicago, Ill.
● Stewart Mfg. Co., Inc., Bloomfield, N. J.
● Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
● Waterloo Register Sales Co., Waterloo, Ia.

REGULATORS, AIR VELOCITY

Barber-Colman Co., Rockford, Ill.
Hays Corp., Michigan City, Ind.
● Johnson Service Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.

REGULATORS, DAMPER SETS

Adams Co., The, Dubuque, Ia.
Air Control Products, Inc., Coopersville, Mich.
American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
● Automatic Products Co., Milwaukee, Wis.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Barber-Colman Co., Rockford, Ill.
Cole-Sewell Engineering Co., St. Paul, Minn.
Fossum, M. H., St. Paul, Minn.
Gerett Corp., M. A., Milwaukee, Wis.
Goese Mfg. Co., Milwaukee, Wis.
Hart & Cooley Mfg. Co., Holland, Mich.
Kerentoff, G. L., Cincinnati, O.
Marcliff, Inc., Toledo, O.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
● Mercoid Corp., The, Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Northern Weatherstrip Co., Duluth, Minn.
Ohio Products Co., Cleveland, O.
Parker-Kalon Corp., New York, N. Y.
● Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
● Trane Co., The, La Crosse, Wis.
United States Register Co., Battle Creek, Mich.
● White-Rodgers Electric Co., St. Louis, Mo.
Young Regulator Co., Cleveland, O.

REGULATORS, DRAFT, COMBUSTION

Askania Regulator Co., Chicago, Ill.
Atlas Utilities Co., Inc., Providence, R. I.
Automatic Products Co., Milwaukee, Wis.
Bailey Meter Co., Cleveland, O.
Boiler Room Equipment, Inc., New York, N. Y.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Campbell Engineering Co., Appleton, Wis.
Cash Co., A. W., Decatur, Ill.
Cole-Sewell Engineering Co., St. Paul, Minn.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Engineer Co., New York, N. Y.
Foster Engineering Co., Newark, N. J.
Foster Wheeler Corp., New York, N. Y.
Foxboro Co., Foxboro, Mass.
● Hagan Corp., Pittsburgh, Pa.
● Hays Corp., Michigan City, Ind.
Hotstream Heater Co., Cleveland, O.
● Illinois Engineering Co., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Leeds & Northrup Co., Philadelphia, Pa.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Master Electric Co., Dayton, O.
● Mercoid Corp., The, Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Ruggles-Klingeman Mfg. Co., Salem, Mass.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Engineering Co., Inc., Walden, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Webster Engineering Co., Tulsa, Okla.

REGULATORS, LEVEL, LIQUID

Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A., York, Pa.
Clayton Mfg. Co., Alhambra, Calif.
Cutler-Hammer, Inc., Milwaukee, Wis.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
● Fisher Governor Co., Marshalltown, Ia.
Griscom-Russell Co., The, New York, N. Y.
Hays Corp., Michigan City, Ind.
● Johnson Corp., Three Rivers, Mich.
● Kieley & Mueller, Inc., North Bergen, N. J.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
● McDonnell & Miller, Inc., Chicago, Ill.
Northern Equipment Co., Erie, Pa.
R-S Products Corp., Philadelphia, Pa.
Trimount Instrument Co., Chicago, Ill.
Wheelco Instruments Co., Chicago, Ill.

REGULATORS, PRESSURE, AIR

American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Inc., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Belfield Co., H., Philadelphia, Pa.
Black Mfg. Co., The, Baltimore, Md.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
● Clark Mfg. Co., Cleveland, O.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
● Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
DeVilbiss Co., The, Toledo, O.
Dockson Corp., Detroit, Mich.
Douglass Automatic Controls Co., South Gate, Calif.
Electric Sprayit Co., The, Sheboygan, Wis.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
● Fulton Sylphon Co., The, Knoxville, Tenn.
Grove Regulator Co., Oakland, Calif.
● Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Hotstream Heater Co., Cleveland, O.
● Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● Mercoid Corp., The, Chicago, Ill.
Monitor Controller Co., The, Baltimore, Md.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
North Penn Co., New York, N. Y.
● Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Engineering Co., Inc., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Thermac Company, Los Angeles, Calif.
Torchweld Equipment Div., National Cylinder Gas Co., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
United Electric Controls Co., Boston, Mass.
Victor Equipment Co., San Francisco, Calif.
Watson & McDaniel Co., Philadelphia, Pa.

REGULATORS, PRESSURE, GAS

American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Inc., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Barber Gas Burner Co., Cleveland, O.
Belfield Co., H., Philadelphia, Pa.
Black Mfg. Co., The, Baltimore, Md.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
● Clark Mfg. Co., Cleveland, O.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Dockson Corp., Detroit, Mich.
Douglass Automatic Controls Co., South Gate, Calif.
Eclipse Fuel Engineering Co., Rockford, Ill.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Fox Control & Mfg. Co., Cleveland, O.
Foxboro Co., Foxboro, Mass.
● General Controls Co., Glendale, Calif.
Grove Regulator Co., Oakland, Calif.
● Hagan Corp., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.

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Hays Corp., Michigan City, Ind.
• Henry Valve Co., Chicago, Ill.
• Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
• Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Liquid Carbonic Corp., The, Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• Mercoid Corp., The, Chicago, Ill.
Monitor Controller Co., The, Baltimore, Md.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Detroit, Mich.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Torchweld Equipment Div., National Cylinder Gas Co., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Victor Equipment Co., San Francisco, Calif.
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.

REGULATORS, PRESSURE, HOT WATER HEATING SYSTEMS

Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
• Bell & Gossett Co., Morton Grove, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Douglass Automatic Controls Co., South Gate, Calif.
• Fisher Governor Co., Marshalltown, Ia.
• Illinois Engineering Co., Chicago, Ill.
Kainer Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Klipfel Mfg. Co., Hamilton, O.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• McDonnell & Miller, Inc., Chicago, Ill.
• Mercoid Corp., The, Chicago, Ill.
Mueller Co., Decatur, Ill.
Perfex Corp., Milwaukee, Wis.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Sarcotherm Controls, Inc., New York, N. Y.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, LaCrosse, Wis.
Watts Regulator Co., Lawrence, Mass.
• White-Rodgers Electric Co., St. Louis, Mo.

REGULATORS, PRESSURE, LIQUID

Atlas Valve Co., Inc., Newark, N. J.
Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Belfield Co., H., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Controller Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Douglass Automatic Controls Co., South Gate, Calif.
• Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Foxboro Co., Foxboro, Mass.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
• Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Healy Ruff Co., St. Paul, Minn.
• Henry Valve Co., Chicago, Ill.
• Johnson Service Co., Milwaukee, Wis.
Justus Steam Trap Co., Napanoch, N. Y.
Keckley Co., O. C., Chicago, Ill.
• Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• McDonnell & Miller, Inc., Chicago, Ill.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
Monitor Controller Co., The, Baltimore, Md.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Norgren Co., C. A., Denver, Colo.
Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
United Electric Controls Co., Boston, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
• White-Rodgers Electric Co., St. Louis, Mo.
Williams Gauge Co., Pittsburgh, Pa. (Feed water)

REGULATORS, STATIC PRESSURE, AIR DUCT

Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Cash Co., A. W., Decatur, Ill.
Hays Corp., Michigan City, Ind.
Hotstream Heater Co., Cleveland, O.
• Johnson Service Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.

REGULATORS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
Armstrong Heat Control Co., Portland, Ore.
Atlas Valve Co., Inc., Newark, N. J.
• Autempco Corp., New York, N. Y.
• Automatic Products Co., Milwaukee, Wis.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Burling Instrument Co., Newark, N. J.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Crown Controls Co., New Breman, O.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
• Detroit Lubricator Co., Detroit, Mich.
Douglass Automatic Controls Co., South Gate, Calif.
• Dunham Co., C. A., Chicago, Ill.
Eastern Engineering Co., New Haven, Conn.
Eclipse Fuel Engineering Co., Rockford, Ill.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Electrimatic, Chicago, Ill.
Foster Engineering Co., Newark, N. J.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
• Fulton Sylphon Co., Knoxville, Tenn.
• General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
• Hagan Corp., Pittsburgh, Pa.
Hart Mfg. Co., The, Hartford, Conn.
Hays Corp., Michigan City, Ind.
Heat Timer Corp., New York, N. Y.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Service Co., Milwaukee, Wis.
Keckley Co., O. C., Chicago, Ill.
Klipfel Mfg. Co., Hamilton, O.
Lawler Automatic Controls, Mount Vernon, N. Y.
Leeds &Northrup Co., Philadelphia, Pa.
Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.

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Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
McCorkle Co., D. H., Berkeley, Calif.
● Mercoid Corp., Chicago, Ill.
Miller Heat-O-Meter Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
● Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Spence Engineering Co., Inc., Walden, N. Y.
Spencer Thermostat Co., Attleboro, Mass.
Square D Co., Detroit, Mich.
Sterling, Inc., Milwaukee, Wis.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
United Electric Controls Co., Boston, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
● Weather Controls Div., Automatic Devices Co., Chicago, Ill.
Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
● White-Rodgers Electric Co., St. Louis, Mo.

RELAYS, ELECTRICAL

Advance Electric and Relay Co., Los Angeles, Calif.
● Allen-Bradley Co., Milwaukee, Wis.
Allied Control Co., Inc., New York, N. Y.
American Gas Accumulator Co., Elizabeth, N. J. (time delay)
American Instrument Co., Silver Spring, Md.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
● Autempco Corp., New York, N. Y.
Automatic Electric Mfg. Co., Mankato, Minn.
Automatic Switch Co., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
B/W Controller Corp., Birmingham, Mich.
Barber-Colman Co., Rockford, Ill.
Bardco Mfg. & Sales Co., Los Angeles, Calif.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Clark Controller Co., Cleveland, O.
Consolidated Car Heating Co., Inc., Albany, N. Y.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cramer Co., Inc., R. W., The, Centerbrook, Conn.
Cutler-Hammer Inc., Milwaukee, Wis.
Davis & Co., Inc., Dean W., Kentland, Ind.
● Detroit Lubricator Co., Detroit, Mich.
Dunn, Inc., Struthers, Philadelphia, Pa.
Durakool, Inc., Elkhart, Ind.
Electro-Switch & Controls Co., Los Angeles, Calif.
Edison, Inc., Thos. A., Instrument Div., West Orange, N. J.
Electro-Switch & Controls Co., Los Angeles, Calif.
Ess Instrument Co., Bergenfield, N. J.
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore, Md.
● General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
H-B Instrument Co., Philadelphia, Pa.
Hart Mfg. Co., Hartford, Conn.
Industrial Engineering Corp., Terre Haute, Ind.
Leach Relay Co., Los Angeles, Calif.
McCorkle Co., D. H., Berkeley, Calif.
● Mercoid Corp., Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Baltimore, Md.
National Time & Signal Corp., Detroit, Mich.
● Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
Potter & Brumfield Sales Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Reynolds Electric Co., Chicago, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
Small Motors, Inc., Chicago, Ill.
Spencer Thermostat Co., Attleboro, Mass.
Square D Co., Milwaukee, Wis.
Struthers Dunn, Inc., Philadelphia, Pa.
Synchro-Start Products, Chicago, Ill.
● Taylor Instrument Companies, Rochester, N. Y.
● Thrush & Co., H. A., Peru, Ind.
Tork Clock Co., Inc., Mt. Vernon, N. Y.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Wallace & Tiernan Co., Inc., Newark, N. J.
Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Weston Electrical Instrument Corp., Newark, N. J.
Zenith Electric Co., Chicago, Ill.

RELIEF VALVES

See Valves, Relief

REPAIR CLAMPS

See Clamps, Pipe Repair

REPAIR PLUGS FOR TANKS

See Plugs, Repair, for Tanks

RESEATERS, VALVE

Chicago Specialty Mfg. Co., Chicago, Ill.
Economy Valve Seat Co., Chicago, Ill.
Leavitt Machine Co., Orange, Mass.
Standard Reseater Corp., New York, N. Y.

REVERSE REFRIGERATION CYCLE UNITS

See Units, Air Conditioning, Reverse Refrigeration Cycle

RINGS, PISTON, FOR COMPRESSORS

American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Perfect Circle Co., The, Hagerstown, Ind.
Perfection Refrigeration Parts Co., Harvey, Ill.
Sealed Power Corp., Muskegon, Mich.

RINGS, WELDING

Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
● Tube Turns, Inc., Louisville, Ky.
Wedge Protectors, Inc., Cleveland, O.

ROD, GAS WELDING

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
● American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Atlantic Steel Co., Atlanta, Ga.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Crucible Steel Co. of America, New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Duraloy Co., Scottdale, Pa. (Stainless)
Eutectic Welding Alloys Corp., New York, N. Y.
International Nickel Co., New York, N. Y.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
Milburn Co., Alexander, Baltimore, Md.
Mir-O-Col Alloy Co., Los Angeles, Calif.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.
● Revere Copper and Brass, Incorporated, New York, N. Y.
Sight Feed Generator Co., Richmond, Ind.
Universal Power Corp., Cleveland, O.
Victor Equipment Co., San Francisco, Calif.
● Youngstown Sheet & Tube Co., Youngstown, O.

ROLLER BEARINGS

See Bearings, Roller

ROOF COOLERS

See Systems, Roof Spraying

ROOF SPRAYING SYSTEMS

See Systems, Roof Spraying

ROOF VENTILATORS

See Ventilators, Roof

ROOM HUMIDIFIERS

See Humidifiers, Unit, Room Type; and Units, Air Conditioning, Winter

ROOM THERMOSTATS

See Thermostats, Room or Wall

ROTARY PUMPS

See Pumps, Rotary

RUBBER BELTING

See Belting, Flat, Rubber

RUBBER PACKING

See Packing, Rubber and Synthetic

RUBBER PIPE

See Pipe, Hard Rubber

SADDLE VALVES

See Valves, Saddle

SAFETY VALVES

See Valves, Safety, Steam

SCREENS, SUN REFLECTING

Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Kane Mfg. Corp., Kane, Pa.

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SEALS, SHAFT, MECHANICAL

Crane Packing Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Rotary Seal Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sealol Corp., Providence, R. I.

SEAMLESS PIPE

See Pipe, Steel, Seamless

SEPARATORS, AIR

Adams Co., Inc., R. P., Buffalo, N. Y.
• Annis Air Filters, Glendale, Calif.
Black Mfg. Co., The, Baltimore, Md.
Bowser, Inc., Fort Wayne, Ind.
Centrifix Corp., Cleveland, O.
• Clark Mfg. Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
• Crane Co., Chicago, Ill.
DeVilbiss Co., The, Toledo, O.
Dollinger Corp., Rochester, N. Y.
Drico Industrial Corp., New York, N. Y.
Gasflux Co., Mansfield, O.
Goodyer Industries, Inc., Chicago, Ill.
• Hagan Corp., Pittsburgh, Pa.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Corp., Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Leavitt Machine Co., Orange, Mass.
Logan Engineering Co., Chicago, Ill.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Spencer Turbine Co., Hartford, Conn.
Spray Engineering Co., Somerville, Mass.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
Textite Corp., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Wright-Austin Co., Detroit, Mich.

SEPARATORS, STEAM AND OIL

• Acme Industries, Inc., Jackson, Mich.
Adams Co., Inc., R. P., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Boylston Steam Specialty Co., Chicago, Ill.
Centrifix Corp., Cleveland, O. (Gas and vapor)
• Clark Mfg. Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
• Crane Co., Chicago, Ill.
Drico Industrial Corp., New York, N. Y.
Elliott Co., Jeannette, Pa.
• Fisher Governor Co., Marshalltown, Ia.
Flotrol Systems, Inc., Tulsa, Okla.
Frick Co., Waynesboro, Pa.
Goodyer Industries, Inc., Chicago, Ill.
• Hagan Corp., Pittsburgh, Pa.
Hoppes Mfg. Co., Springfield, O.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Corp., Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
National Valve & Mfg. Co., Pittsburgh, Pa.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
Temprite Products Corp., Detroit, Mich.
Textite Corp., Chicago, Ill.
• Webster & Co., Warren, Camden, N. J.
• Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
Wright-Austin Co., Detroit, Mich.

SEWAGE EJECTORS

See Ejectors, Sewage

SEWAGE PUMPS

See Pumps, Sewage

SHAFT SEALS, MECHANICAL

See Seals, Shaft, Mechanical

SHAFTS, FLEXIBLE, PUSH-PULL, FOR CONTROL

Arens Controls, Inc., Chicago, Ill.

SHEARS, ELECTRIC, PORTABLE

• Black & Decker Mfg. Co., Towson, Md.
C-B Tool Co., Lancaster, Pa.
G. D. S. Machinery & Supply Co., Inc., New York, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Skilsaw, Inc., Chicago, Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Van Dorn Electric Tool Co., Towson, Md.

SHEARS, POWER

Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Inc., Cambridge City, Ind.
Bliss Co., E. W., Detroit, Mich.
Buckeye Tools Corp., Dayton, O.
• Buffalo Forge Co., Buffalo, N. Y.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore, Beloit, Wis.
Marshalltown Mfg. Co., Marshalltown, Ia.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Parker Mfg. Co., Santa Monica, Calif.
Peck, Stow & Wilcox Co., Southington, Conn.
Quickwork Div., Whiting Corp., Harvey, Ill.
Rafter Machine Co., Inc., Belleville, N. J.
St. Louis Tool Co., St. Louis, Mo.
Whitney Metal Tool Co., Rockford, Ill.
Yoder Co., The, Cleveland, O.

SHEARS AND SNIPS, HAND

Armstrong-Blum Mfg. Co., Chicago, Ill.
Bartlett Mfg. Co., Detroit, Mich.
Beverly Throatless Shear Co., Chicago, Ill.
Bremil Mfg. Co., Erie, Pa.
Clauss Shear Co., Fremont, O.
Crescent Tool Co., Jamestown, N. Y.
Excelsior Tool & Machine Co., East St. Louis, Ill.
G. D. S. Machine & Supply Co., Inc., New York, N. Y.
Grobet File Corp. of America, New York, N. Y.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt. (Angle)
Klenk's Aviation Snips, Wilmington, Del.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
Snap-On Tools Corp., Kenosha, Wis.
Viking Shear Co., Erie, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Wiss & Sons Co., J., Newark, N. J.

SHEAVES

See Pulleys and Sheaves, for Belt Drives

SHEET METAL BRAKES

See Brakes, Sheet Metal

SHEET METAL DUCTS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL FITTINGS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL PUNCHES

See Punches, Sheet Metal

SHEETS, ALUMINUM

• Aluminum Co. of America, Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Fairmont Aluminum Co., Fairmont, W. Va.
Reynolds Metals Co., Richmond, Va.

SHEETS, ALUMINUM COATED

• American Rolling Mill Co., The, Middletown, O.

SHEETS AND BOARD, NON-METALLIC, FOR DUCT CONSTRUCTION

Carey Mfg. Co., Philip, Cincinnati, O.
Celotex Corp., The, Chicago, Ill.
• Grant Wilson, Inc., Chicago, Ill.
Johns-Manville, New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Keystone Asphalt Products Co., Chicago, Ill.
Masonite Corp., Chicago, Ill.
Ruberoid Co., New York, N. Y.
Sall Mountain Co., Chicago, Ill.
Technical Ply-Woods, Chicago, Ill.
United States Gypsum Co., Chicago, Ill.
• Wilson, Inc., Grant, Chicago, Ill.

SHEETS, CLAD

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
• Aluminum Co. of America, Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill.
• American Rolling Mill Co., The, Middletown, O.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Follansbee Steel Corp., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill. (Stainless)
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.

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Jessop Steel Co., Washington, Pa.
Lamb & Ritchie Co., Cambridge, Mass.
Lukens Steel Co. and Subsidiaries, Coatesville, Pa.

SHEETS, COPPER

● American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hussey & Co., C. G., Pittsburgh, Pa.
Klauer Mfg. Co., Dubuque, Ia.
New Haven Copper Co., Seymour, Conn.
● Revere Copper and Brass, Incorporated, New York, N. Y.
● Weirton Steel Co., Weirton, W. Va.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill. (Brass, bronze, phosphor bronze)

SHEETS, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Continental Steel Corp., Kokomo, Ind. (Coated)
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Illinois Zinc Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Wks., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
● Weirton Steel Co., Weirton, W. Va. (Alloy coated)

SHEETS, MAGNESIUM ALLOY

● Dow Chemical Co., The, Midland, Mich.
● Revere Copper and Brass, Incorporated, New York, N. Y.

SHEETS, METAL, WITH PROTECTIVE NON-METALLIC COATING

American Steel Band Co., Pittsburgh, Pa.
Cheney Metal Products Co., Trenton, N. J.
Protected Steel Products Co., Washington, Pa.
Technical Ply-Woods, Chicago, Ill. (Metal and plywood)

SHEETS, NICKEL AND NICKEL ALLOY

American Nickeloid Co., Peru, Ill.
International Nickel Co., New York, N. Y.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lukens Steel Co. and Subsidiaries, Coatesville, Pa.
● Revere Copper and Brass Incorporated, New York, N. Y.
Robertson Co., H. H., Pittsburgh, Pa.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill.

SHEETS, STEEL, COPPER BEARING

● American Rolling Mill Co., The, Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
● Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Follansbee Steel Corp., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Lukens Steel Co. and Subsidiaries, Coatesville, Pa.
Newport Rolling Mill Co., Div. of International Detrola Corp., Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Co., The, Canton, O.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
● Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
● Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS, STEEL, GALVANIZED

● American Rolling Mill Co., The, Middletown, O.
Apollo Steel Co., Apollo, Pa.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
● Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, New York, N. Y.
Empire Sheet & Tin Plate Co., Mansfield, O.
Follansbee Steel Corp., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Detroit, Mich.
Inland Steel Co., Chicago, Ill.
Klauer Mfg. Co., Dubuque, Ia.
Lyon, Conklin & Co., Inc., Baltimore, Md.
Newport Rolling Mill Co., Div. of International Detrola Corp., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Co., The, Canton, O.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
● Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wood Steel Co., Alan, Conshohocken, Pa.

SHEETS, STEEL, GALVANNEALED

Berger Mfg. Div., Republic Steel Corp., Canton, O.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
Newport Rolling Mill Co., Div. of International Detrola Corp., Newport, Ky.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Sheet Steel Co., The, Div. of Continental Steel Corp., Canton, O.

SHEETS, STEEL, STAINLESS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
● American Rolling Mill Co., The, Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, New York, N. Y.
Eastern Stainless Steel Corp., Baltimore, Md.
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Steel Corp., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
Universal Cyclops Steel Corp., Bridgeville, Pa.
Washington Steel Corp., Washington, Pa.

SHEETS, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.
Potts Sons & Co., W. F., Philadelphia, Pa.

SHEETS, ZINC

American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
American Zinc Products Co., Greencastle, Ind.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Hegeler Zinc Co., Danville, Ill.
Illinois Zinc Co., Chicago, Ill.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Sales Co., New York, N. Y.

SHUTTERS

See Louvers and Shutters

SIGHT GLASSES

See Glasses, Sight, for Pipe Lines

SLEEVE BEARINGS

See Bearings, Sleeve

SLEEVES, PIPE REPAIR

See Clamps, Pipe Repair

SLIME AND ALGAE CONTROL, WATER TREATMENT FOR

See Treatment, Water, for Slime and Algae Control

SMOKE ALARMS

See Alarms, Smoke

SMOKE GUNS

See Guns and Pots, Smoke and Smudge

SMUDGE POTS

See Guns and Pots, Smoke and Smudge

SOCKET WRENCHES

See Wrenches, Socket

SOFTENERS, WATER

American Water Softener Co., Philadelphia, Pa.
Bogue Electric Co., Paterson, N. J.
Elgin Softener Corp., Elgin, Ill.
Cochrane Corp., Philadelphia, Pa.
MacDermid Chemical Co., Bristol, Conn.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
● Research Products Corp., Madison, Wis.
Uniflow Mfg. Co., Erie, Pa.
Warlo Corp., New York, N. Y.

SOLAR HEAT RESISTING SCREENS

See Screens, Sun Reflecting

SOLDER (SILVER), BRAZING ALLOYS, AND FLUXES

Air Reduction Sales Co., New York, N. Y.
Atkins & Co., E. C., Indianapolis, Ind.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.

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• Handy & Harman, New York, N. Y.
Hardy, Inc., Charles, New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Co., Lloyd S., Chicago, Ill.
• Mueller Brass Co., Port Huron, Mich.
National Cylinder Gas Co., Chicago, Ill.
Special Chemicals Corp., New York, N. Y.

SOLDER (TIN-LEAD), AND FLUXES

Air Reduction Sales Co., New York, N. Y.
Alpha Metals, Inc., Brooklyn, N. Y.
• American Brass Co., Waterbury, Conn.
American Solder & Flux Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Benson Co., Inc., Alex R., Hudson, N. Y.
Burnley Battery & Mfg. Co., North East, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Eagle-Picher Co., Cincinnati, O.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Galv-Weld Products, Dayton, O.
Gardiner Metal Co., Chicago, Ill.
Glaser Lead Co., Inc., Brooklyn, N. Y.
Hercules Chemical Co., Inc., New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Co., Lloyd S., Chicago, Ill.
Johnston Tin Foil & Metal Co., The, St. Louis, Mo.
Kester Solder Co., Chicago, Ill.
Klauer Mfg. Co., Dubuque, Ia.
Lewis Laboratories, Inc., Paul, Milwaukee, Wis.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
Merchant & Evans Co., Philadelphia, Pa.
• Mueller Brass Co., Port Huron, Mich.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Works, Inc., Rochester, N. Y.
Ruby Chemical Co., Columbus, O.
Special Chemicals Corp., New York, N. Y.
Turco Products, Inc.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wolfe-Kote Co., Sheboygan, Wis.

SOLENOIDS AND SOLENOID COILS

• Allen-Bradley Co., Milwaukee, Wis.
Automatic Switch Co., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cook Electric Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis & Co., Inc., Dean W., Kentland, Ind.
Electric Controller & Mfg. Co., Cleveland, O.
Essex Wire Corp., Div. of, Detroit, Mich.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Jefferson Electric Co., Bellwood, Ill.
National Acme Co., The, Cleveland, O.
Soreng Mfg. Co., Chicago, Ill.
Trombetta Solenoid Co., Milwaukee, Wis.
Ward Leonard Electric Co., Mt. Vernon, N. Y.
West Coast Electrical Mfg. Co., Los Angeles, Calif.

SOLENOID VALVES

See Valves, Solenoid

SOOT BLOWERS

See Blowers, Soot

SOOT DESTROYERS

See Destroyers, Soot, Chemical

SOUND DEADENING FOR CEILING AND WALL

See Insulation, Ceiling and Wall, Sound Deadening

SOUND DEADENING FOR DUCTS

See Insulation, Duct, Sound Deadening

SOUND INDICATORS

See Indicators, Sound Level

SPARGER NOZZLES

See Nozzles, Sparger, for Tank Heating

SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical

SPEED REDUCERS

See Reducers, Speed

SPIRAL PIPE

See Pipe, Spiral, Riveted and Welded

SPOT WELDERS

See Welders, Spot

SPRAY HUMIDIFIERS

See Humidifiers, Direct, Spray Head

SPRAY NOZZLES

See Nozzles, Spray

SPRAY PAINTING BOOTHS

See Booths, Painting, Spray

SPRINKLER HEADS

See Heads, Sprinkler

SPRINKLER SYSTEM CONTROLS

See Controls, Fire Protection Sprinkler Systems; Valves, Fire Protection Sprinkler System Control

STAINLESS STEEL PIPE

See Pipe, Steel, Stainless

STAINLESS STEEL SHEETS

See Sheets, Steel, Stainless

STANDS, PIPE VISE

American Pipe Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Crown Die & Tool Co., Chicago, Ill.
Martin & Sons, H. P., Owensboro, Ky.
Nye Tool & Machine Co., Chicago, Ill.
• Ridge Tool Co., Elyria, O.
Western Wire Products Co., St. Louis, Mo.
Williams & Co., J. H., Buffalo, N. Y.

STEAM BOOSTER COMPRESSORS

See Compressors, Steam Booster

STEAM ENGINES

See Engines, Steam

STEAM JET HEATERS

See Heaters, Steam Jet, for Liquids

STEAM JET REFRIGERATION

See Compressors, Refrigerating, Steam Jet

STEAM PRESSURE REGULATORS

See Valves, Pressure Reducing and Regulating

STEAM PUMPS

See Pumps, Steam

STEAM SEPARATORS

See Separators, Steam and Oil

STEAM TRAPS

See Traps, Steam

STEEL PIPE

See Pipe, Steel

STEEL TUBE FITTINGS, FLARED

See Fittings, Steel Tube, Flared

STEEL TUBING

See Tubing, Steel

STEEL UNIONS

See Unions, Steel

STEEL VALVES

See Valves, Gate; and Valves, Globe

STERILIZING LAMPS

See Lamps, Sterilising, for Duct Installation

STERILIZING UNITS

See Units, Sterilising, Air

STOCKS AND DIES

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Champion Blower & Forge Co., Lancaster, Pa.
Crown Die & Tool Co., Chicago, Ill. (Pipe)
Erie Tool Wks., Erie, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hollands Mfg. Co., Erie, Pa.
Nye Tool & Machine Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
• Ridge Tool Co., Elyria, O.
Toledo Pipe Threading Machine Co., Toledo, O.

STOKERS, INDUSTRIAL AND COMMERCIAL

61 to 1200 Lb per Hr

Allen Stoker Co., Allentown, Pa.
American Coal Burner Co., Chicago, Ill.
American Engineering Co., Philadelphia, Pa.
Anchor Stove & Range Co., New Albany, Ind.
Auburn Burner Co., Auburn, Ind.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Automatic Firing Corp., St. Louis, Mo.
Babcock & Wilcox Co., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.

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● Brownell Co., Dayton, O.
Burke Stoker & Mfg. Co., Chicago, Ill.
Burnham Stoker Co., Vancouver, Wash.
Canton Stoker Corp., Canton, O.
Carnes, Inc., John R., Lima, O.
Carpenter Heating & Stoker Co., Cleveland, O.
Central Rubber & Steel Corp., Findlay, O.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Combustion Engineering Co., Inc., New York, N. Y.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Detroit Stoker Co., Detroit, Mich.
Diamond Iron Works, Inc., Minneapolis, Minn.
Econocol Stoker Div. of Cotta Transmission Co., Rockford, Ill.
Eddy Stoker Corp., Chicago, Ill.
Fairbanks, Morse & Co., Chicago, Ill.
Fire-King Stoker Co., Indianapolis, Ind.
Firemood Machine Wks., Converse, Ind.
Frederick Iron & Steel Co., Frederick, Md.
Flynn & Emrich Co., Baltimore, Md.
Freeman Stoker Div., Illinois Iron & Bolt Co., Chicago, Ill.
Fuel Savers, Inc., Harrisburg, Pa.
● Gehl Bros. Mfg. Co., West Bend, Wis.
General Machinery Co., Spokane, Wash.
Gunnite Foundries Corp., Rockford, Ill. (Screws)
Heating Assurance, Inc., Spokane, Wash.
Her-Born Engrg. & Mfg. Co., Sandusky, O.
Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Hoffman Combustion Engineering Co., Detroit, Mich.
Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
International Engineering Wks., Inc., Framingham, Mass.
● Iron Fireman Mfg. Co., Cleveland, O.
Johnston & Jennings Co., Cleveland, O.
Kingston Products Corp., Kokomo, Ind.
Kol-Master Corp., Oregon, Ill.
Laclede Stoker Co., St. Louis, Mo.
Leffel & Co., Springfield, O.
Link-Belt Co., Chicago, Ill.
"Loyal Knight" Stokers, Inc., Belleville, Ill.
Mallory Sales Co., Dolton, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Muncie Gear Wks., Inc., Muncie, Ind.
National Steam Pump Co., Upper Sandusky, O.
Newcomb Engineering Co., Grand Rapids, Mich.
Northern Steel & Stoker Corp., Peoria, Ill.
Ormsby-Osterman, Inc., St. Louis, Mo.
OverSpred Stoker Co., Chicago, Ill.
Peerless Mfg. Corp., Louisville, Ky.
Plymouth Industries, Inc., Plymouth, Ind.
Pocahontas Fuel Co., Inc., Stoker Div., Cleveland, O.
Rheem Mfg. Co., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sinker-Davis Co., Indianapolis, Ind.
Steel Products Engineering Co., Springfield, O.
Stokol-Stoker, Indianapolis, Ind.
Sun-Fire Stoker Corp., New Albany, Ind.
Thermal Engineering Co., Chicago, Ill.
U. S. Machine Corp., Lebanon, Ind.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Whiting Stoker Sales Co., Chicago, Ill.
Whitty Co., Inc., Boston, Mass.
Will-Burt Co., The, Orrville, O.

STONEWARE PIPE

See Pipe, Stoneware

STORAGE WATER HEATERS

See Heaters, Water, Steam, Storage

STRAINERS, PIPE LINE

● Alco Valve Co., St. Louis, Mo.
Alten's Foundry & Machine Works, Lancaster, O.
American District Steam Co., North Tonawanda, N. Y.
American Injector Co., Detroit, Mich.
Andale Co., Philadelphia, Pa.
● Anderson Co., V. D., The, Cleveland, O.
Barrett, Haentjens & Co., Hazleton, Pa.
● Bishop & Babcock Mfg. Co., Cleveland, O.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Boylston Steam Specialty Co., Chicago, Ill.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Cashin Co., W. D., Boston, Mass.
Clark Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
● Crane Co., Chicago, Ill.
Cuno Engineering Corp., Meriden, Conn.
Davis Regulator Co., Chicago, Ill.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Drico Industrial Corp., New York, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Elliott Co., Jeannette, Pa.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Foster Pump Works, Inc., Brooklyn, N. Y.
● General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
● Henry Valve Co., Chicago, Ill.
● Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Chicago, Ill.
● Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
● Kieley & Mueller, Inc., North Bergen, N. J.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lealie Co., Lyndhurst, N. J.
● Maid-O'-Mist, Inc., Chicago, Ill.
Manufacturers Fin Coil Co., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
● Mueller Brass Co., Port Huron, Mich.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Long Island City, N. Y.
Newark Wire Cloth Co., Newark, N. J.
Nicholson & Co., W. H., Wilkes-Barre, Pa.
Phillips & Co., H. A., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
● Sarco Co., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
Sheffler-Gross Co., Philadelphia, Pa.
Spence Engineering Co., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
● Spraying Systems Co., Chicago, Ill.
Staples & Pfeiffer, San Francisco, Calif.
Sterling, Inc., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
● Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Trimount Rotary Power Co., East Dedham, Mass.
Tryco Products, Inc., Westfield, Mass.
Wade Mfg. Co., Elgin, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
● Webster & Co., Warren, Camden, N. J.
Webster Electric Co., Racine, Wis. (For oil burners)
Winslow Engineering Co., Oakland, Calif.
Wright-Austin Co., Detroit, Mich.
● Yarnall-Waring Co., Philadelphia, Pa.

STRESS RELIEVERS

See Preheaters and Stress Relievers, Electric, for Pipe Welds

STRIP HEATERS

See Heaters, Strip and Immersion, Electric

STRUCTURAL SHAPES

See Angles, Bars, Beams, Channels and Tees

STUD WELDERS

See Welders, Stud

SUCTION LINE HEAT EXCHANGERS

See Exchangers, Heat, Refrigerant Suction Line

SUMP PUMPS

See Pumps, Sump

SUPERHEATERS, PROCESS STEAM

● Bell & Gossett Co., Morton Grove, Ill.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Combustion Engineering Co., Inc., New York, N. Y.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Foster Wheeler Corp., New York, N. Y.
Goodyer Industries, Inc., Chicago, Ill.
Selas Corp. of America, Philadelphia, Pa.
Springfield Boiler Co., Springfield, Ill.

SURFACE, FINNED, COOLING, BRINE

● Acme Industries, Inc., Jackson, Mich.
Aerofin Corp., Syracuse, N. Y.
● American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
● Bush Mfg. Co., Hartford, Conn.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

● Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
G. & O. Mfg. Co., New Haven, Conn.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Griscom-Russell Co., The, New York, N. Y.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kramer Trenton Co., Trenton, N. J.
● Marlo Coil Co., St. Louis, Mo.
● McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
● Murray Mfg. Co., D. J., Wausau, Wis.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Rrefrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
Roessing Mfg. Co., Pittsburgh, Pa.
Rome-Turney Radiator Co., Rome, N. Y.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
● Trane Co., The, La Crosse, Wis.
Vilter Mfg. Co., Milwaukee, Wis.
● Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, COLD WATER

● Acme Industries, Inc., Jackson, Mich.
Aerofin Corp., Syracuse, N. Y.
● Airtemp, Div. of Chrysler Corp., Dayton, O.
● American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
● Bush Mfg. Co., Hartford, Conn.
Caldwell Co., Wm. J., Washington, D. C.
Campbell Heating Co., E. K., Kansas City, Mo.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
● Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates- American Machine Co., Beloit, Wis.
Griscom-Russell Co., The, New York, N. Y.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Johnson Fan & Blower Corp., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
● Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
Manufacturers Fin Coil Co., Chicago, Ill.
● Marlo Coil Co., St. Louis, Mo.
● McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
● Modine Mfg. Co., Racine, Wis.
● Murray Mfg. Co., D. J., Wausau, Wis.
● Nesbitt, Inc., John J., Philadelphia, Pa.
Niagara Blower Co., New York, N. Y.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
Roessing Mfg. Co., Pittsburgh, Pa.
Rome-Turney Radiator Co., Rome, N. Y.
Standard Galvanizing Co., Chicago, Ill.
Sturtevant Co., B. F., Div. of Wistinghouse Electric, Hyde Park, Boston, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
● Trane Co., The, La Crosse, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
● Wing Mfg. Co., L. J., New York, N. Y.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, DIRECT EXPANSION

● Acme Industries, Inc., Jackson, Mich.
Aerofin Corp., Syracuse, N. Y.
● Airtemp Div. of Chrysler Corp., Dayton, O.
● American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
Betz Corp., Hammond, Ind.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
● Bush Mfg. Co., Hartford, Conn.
Caldwell Co., Wm. J., Washington, D. C.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
● Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates- American Machine Co., Beloit, Wis.
Griscom-Russell Co., The, New York, N. Y.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
● Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
Manufacturers Fin Coil Co., Chicago, Ill.
● Marlo Coil Co., St. Louis, Mo.
● McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
● Murray Mfg. Co., D. J., Wausau, Wis.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
Roessing Mfg. Co., Pittsburgh, Pa.
Rome-Turney Radiator Co., Rome, N. Y.
Standard Galvanizing Co., Chicago, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Tenney Engineering, Inc., Newark, N. J.
● Trane Co., The, La Crosse, Wis.
United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
● Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

SURFACE, FINNED, HEATING, INDIRECT, FERROUS

Bayley Blower Co., Milwaukee, Wis.
Blackburn-Smith Mfg Co., Hoboken, N. J.
Brown Fintube Co., The, Elyria, O.
Campbell Heating Co., E. K., Kansas City, Mo.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
G. & O. Mfg. Co., New Haven, Conn.
Goodyer Industries, Inc., Chicago, Ill.
Griscom-Russell Co., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Manufacturers Fin Coil Co., Chicago, Ill.
● Modine Mfg. Co., Racine, Wis.
● Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
New York Blower Co., Chicago, Ill.
Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Tenney Engineering, Inc., Newark, N. J.
● Vulcan Radiator Co., Hartford, Conn.

SURFACE, FINNED, HEATING, INDIRECT, NON-FERROUS

Aerofin Corp., Syracuse, N. Y.
● Airtherm Mfg. Co., St. Louis, Mo.
● American Blower Corp, Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Beacon-Morris Corp., Boston, Mass.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
● Bush Mfg. Co., Hartford, Conn.
Caldwell Co., Wm. J., Washington, D. C.
Campbell Heating Co., E. K., Kansas City, Mo.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
● Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Goodyer Industries, Inc., Chicago, Ill.
Griscom-Russell Co., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Johnson Fan & Blower Corp., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
● Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Atlanta, Ga.
Manufacturers Fin Coil Co., Chicago, Ill.
● Marlo Coil Co., St. Louis, Mo.
● McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

- Modine Mfg. Co., Racine, Wis.
- Murray Mfg. Co., D. J., Wausau, Wis.
- Nesbitt, Inc., John J., Philadelphia, Pa.

Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.

- Rempe Co., Chicago, Ill.

Rome-Turney Radiator Co., Rome, N. Y.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.

- Trane Co., The, La Crosse, Wis.
- United States Air Conditioning Corp., Minneapolis, Minn.
- Vulcan Radiator Co., Hartford, Conn.
- Wing Mfg. Co., L. J., New York, N. Y.
- Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

SURFACE THERMOSTATS

See Thermostats, Surface

SWING JOINTS

See Joints, Pipe, Flexible Swing and Revolving

SWITCHES, ELECTRICAL

Acro Electric Co., Cleveland, O.
Adam Electric Co., Frank, St. Louis, Mo.
Aerotec Co., White Plains, N. Y.

- Allen-Bradley Co., Milwaukee, Wis.
- Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Automatic Switch Co., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Clark Controller Co., Cleveland, O.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Delta-Star Electric Co., Chicago, Ill.
Dunn, Inc., Struthers, Philadelphia, Pa.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Mfg. Co., Minneapolis, Minn.

- General Controls Co., Glendale, Calif.

General Electric Co., Appartus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hart Mfg. Co., Hartford, Conn.
Martens & Stormoen, Boston, Mass.

- McDonnell & Miller, Inc., Chicago, Ill.
- Mercoid Corp., Chicago, Ill.

Micro Switch Div. of First Industrial Corp., Freeport, Ill.

- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Monitor Controller Co., The, Baltimore, Md.
Morse-Smith-Morse, Inc., Watertown, Mass.

- Penn Electric Switch Co., Goshen, Ind.

Soreng Mfg. Co., Chicago, Ill.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Struthers Dunn, Inc., Philadelphia, Pa.
Thermix Engineering Co., Greenwich, Conn.
Tork Clock Co., Inc., Mount Vernon, N. Y.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Ward Leonard Electric Co., Mount Vernon, N. Y.
Westinghouse Electric Corp., East Pittsburgh, Pa.
White Mfg. Co., St. Paul, Minn.
Zenith Electric Co., Chicago, Ill.

SWITCHES, FLOAT, REFRIGERATION

- Alco Valve Co., St. Louis, Mo.

Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Clark Controller Co., Cleveland, O.
Frick Co., Waynesboro, Pa.
Magnetrol, Inc., Chicago, Ill.

- McDonnell & Miller, Inc., Chicago, Ill.
- Mercoid Corp., The, Chicago, Ill.

Square D Co., Detroit, Mich.

SWITCHES, FLOW

Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Drying Systems, Inc., Chicago, Ill.

- General Controls Co., Glendale, Calif.

Magnetrol, Inc., Chicago, Ill.

- McDonnell & Miller, Inc., Chicago, Ill.

SWITCHES, LIQUID LEVEL

- Alco Valve Co., St. Louis, Mo.
- Allen-Bradley Co., Milwaukee, Wis.

Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Automatic Control Co., St. Paul, Minn.
B/W Controller Corp., Birmingham, Mich.
Bennett Oil Co., Omaha, Neb.
Cissell Mfg. Co., W. M., Louisville, Ky.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.

- Detroit Lubricator Co., Detroit, Mich.
- General Controls Co., Glendale, Calif.

General Electric Co., Appartus Dept., Schenectady, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Magnetrol Inc., Chicago, Ill.

- McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
- McDonnell & Miller, Inc., Chicago, Ill.
- Mercoid Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Monitor Controller Co., The, Baltimore, Md.

- Penn Electric Switch Co., Goshen, Ind.

Photoswitch, Inc., Cambridge, Mass.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.

- Stephens-Adamson Mfg. Co., Aurora, Ill.

United Cinephone Corp., Torrington, Conn.
Westinghouse Electric Corp., East Pittsburgh, Pa.

SWITCHES, MERCURY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Durakool, Inc., Elkhart, Ind.
Hart Mfg. Co., Hartford, Conn.

- Mercoid Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

SWITCHES, PRESSURE AND VACUUM

Aerotec Co., White Plains, N. Y.

- Allen-Bradley Co., Milwaukee, Wis.
- Autempco Corp., New York, N. Y.

Automatic Control Co., St. Paul, Minn.
Barber-Colman Co., Rockford, Ill.
Clark Controller Co., Cleveland, O.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.

- Detroit Lubricator Co., Detroit, Mich.

General Electric Co., Appartus Dept., Schenectady, N. Y.
Giannini Co., Inc., G. M., Pasadena, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Meletron Corp., Los Angeles, Calif.

- Mercoid Corp., Chicago, Ill.
- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Monitor Controller Co., The, Baltimore, Md.

- Penn Electric Switch Co., Goshen, Ind.

Perfex Corp., Milwaukee, Wis.
Sampsel Time Control, Inc., Spring Valley, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Spencer Thermostat Co., Attleboro, Mass.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Thermix Engineering Co., Greenwich, Conn.
Vapor Car Heating Co., Inc., Chicago, Ill.
Westinghouse Electric Corp., East Pittsburgh, Pa.

- White-Rodgers Electric Co., St. Louis, Mo.

SWITCHES, TIME

- Allen-Bradley Co., Milwaukee, Wis.

American Gas Accumulator Co., Elizabeth, N. J.

- Autempco Corp., New York, N. Y.

Automatic Electric Mfg. Co., Mankato, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cramer Co., Inc., R. W., The, Centerbrook, Conn.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.

- Hansen Mfg. Co., Princeton, Ind. (timing motors and time machine)

Healy Ruff Co., St. Paul, Minn.
Heat Timer Corp., New York, N. Y.
Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
International Register Co., Chicago, Ill.
Landis & Gyr, Inc., New York, N. Y.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.

- Mercoid Corp., Chicago, Ill.

Miller Heat-O-Meter Co., Milwaukee, Wis.

- Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

National Time & Signal Corp., Detroit, Mich.
Paragon Electric Co., Two Rivers, Wis.

- Penn Electric Switch Co., Goshen, Ind.

Perfex Corp., Milwaukee, Wis.
Photoswitch, Inc., Cambridge, Mass.
Reliance Automatic Lighting Co., Racine, Wis.
Reynolds Electric Co., Chicago, Ill.
Rhodes, Inc., M. H., Hartford, Conn.
Sampsel Time Control, Inc., Spring Valley, Ill.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Sangamo Electric Co., Springfield, Ill.
Tork Clock Co., Inc., Mount Vernon, N. Y.
Ward Leonard Electric Co., Mount Vernon, N. Y.
• Weather Controls Div., Automatic Devices Co., Chicago, Ill.
Westinghouse Electric Corp., East Pittsburgh, Pa.
• White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

SWIVEL PIPE COUPLINGS

See Joints, Pipe, Flexible Swing and Revolving

SYSTEMS, COMBUSTION CONTROL

Askania Regulator Co., Chicago, Ill.
Bailey Meter Co., Cleveland, O.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Davis Emergency Equipment Co., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Ess Instrument Co., Bergenfield, N. J.
• Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Hotstream Heater Co., Cleveland, O.
• Illinois Engineering Co., Chicago, Ill.
Leeds & Northrup Co., Philadelphia, Pa.
• Mercoid Corp., Chicago, Ill.
Perfex Corp., Milwaukee, Wis.
Republic Flow Meters Co., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Selas Corp. of America, Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.

SYSTEMS, HEATING, HOT WATER

Barber-Colman Co., Rockford, Ill.
• Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
• General Fittings Co., Providence, R. I.
Gerstein & Cooper Co., South Boston, Mass.
• Hoffman Specialty Co., Indianapolis, Ind.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Lawler Automatic Controls, Mount Vernon, N. Y.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sullivan Valve & Engineering Co., Butte, Mont.
Taco Heaters, Inc., New York, N. Y.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
• Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, VACUUM

Anderson Products, Inc., Cambridge, Mass.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
Cashin, W. D., Boston, Mass.
• Dunham Co., C. A., Chicago, Ill.
• Hoffman Specialty Co., Indianapolis, Ind.
• Illinois Engineering Co., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh, Corp., Chicago, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sterling, Inc., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
• Trane Co., The, La Crosse, Wis.
• Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, VAPOR

American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
• Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
• Hoffman Specialty Co., Indianapolis, Ind.
• Illinois Engineering Co., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sterling, Inc., Milwaukee, Wis.
• Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
• Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, ZONE CONTROL

Armstrong Heat Control Co., Portland, Ore.
• Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
• Bell & Gossett Co., Morton Grove, Ill.
• Dunham Co., C. A., Chicago, Ill.
Heat Timer Corp., New York, N. Y.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Service Co., Milwaukee, Wis.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
• Mercoid Corp., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spence Engineering Co., Inc., Walden, N. Y.
Sullivan Valve & Engineering Co., Butte, Mont.
• Tallmadge & Co., Webster, East Orange, N. J.
• Thrush & Co., H. A., Peru, Ind.
• Webster & Co., Warren, Camden, N. J.
• Webster Tallmadge & Co., East Orange, N. J.
Wheelco Instruments Co., Chicago, Ill.

SYSTEMS, PROCESS HEATING, HIGH TEMPERATURE

• Air Devices, Inc., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
• Dow Chemical Co., The, Midland, Mich.
• Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Foster Wheeler Corp., New York, N. Y.
Goodyer Industries, Inc., Chicago, Ill.
• Illinois Engineering Co., Chicago, Ill.
Lee Engineering Co., Youngstown, O.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
Parks-Cramer Co., Fitchburg, Mass.
Sarcotherm Controls, Inc., New York, N. Y.
Selas Corp. of America, Philadelphia, Pa.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., The, St. Louis, Mo.
Trent Co., Harold E., Philadelphia, Pa.
Williams, Inc., F. C., Dearborn, Mich.
• Wing Mfg. Co., L. J., New York, N. Y.

SYSTEMS, ROOF SPRAYING (FOR COOLING ROOFS)

April Showers Co., Washington, D. C.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Marley Co., Inc., The, Kansas City, Kan.
Rockwood Sprinkler Co., Worcester, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Ruppright, Siegfried, Los Angeles, Calif.
Spray Engineering Co., Somerville, Mass.
• Spraying Systems Co., Chicago, Ill.
Thermal Industries, Indio, Calif.
Water Cooling Corp., New York, N. Y.

SYSTEMS, SPRINKLER, FOR AIR CONDITIONING DUCT SYSTEMS

American Cooling Tower Co., Kansas City, Mo.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Rockwood Sprinkler Co., Worcester, Mass.
Water Cooling Corp., New York, N. Y.

TANK HEADS

See Parts, for Heating and Air Conditioning Equipment

TANKS, EXPANSION, FOR HOT WATER HEATING SYSTEMS

• Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Works Co., E. Akron, O.
Buffalo Tank Corp., Dunellen, N. J.
Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Certified Furnace Co., Div. of Stainless & Steel Products Co., St. Paul, Minn.
Flori Pipe Co., The, St. Louis, Mo.
Frank Heaters, Inc., Paterson, N. J.
Kehm Corp., The, Chicago, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Rheem Mfg. Co., New York, N. Y.
Scaife Co., Oakmont, Pa.
• Thrush & Co., H. A., Peru, Ind.
• Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Wheeler Steel Corp., Wheeling, W. Va.

TANKS, PROCESS AND STORAGE

Aeroil Products Co., West New York, N. J.
• Aluminum Co. of America, Pittsburgh, Pa.
American Car & Foundry Co., New York, N. Y.
American Hard Rubber Co., New York, N. Y. (Rubber lined)
Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
• Bell & Gossett Co., Morton Grove, Ill.
Bigelow Co., New Haven, Conn.
Biggs Boiler Wks. Co., E. Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
• Brownell Co., Dayton, O.
Buffalo Tank Corp., Dunellen, N. J.

Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Certified Furnace Co., Div. of Stainless & Steel Products Co., St. Paul, Minn.
Chicago Bridge & Iron Co., Chicago, Ill.
Chicago Steel Tank Co., Chicago, Ill.
Columbian Steel Tank Co., Kansas City, Mo.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Connery Construction Co., Philadelphia, Pa.
Continental Diamond Fibre Co., Newark, Del.
Dahlquist Mfg. Co., Inc., Somerville, Mass.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Day Co., The, Minneapolis, Minn.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Dillon Steam Boiler Wks., Inc., D. M., Fitchburg, Mass.
Downingtown Iron Works, Downingtown, Pa.
Downs-Smith Brass & Copper Co., New York, N. Y.
Eclipse Fuel Engineering Co., Rockford, Ill.
Elastic Porcelain Lining Corp., Rochester, N. Y. (Tank linings)
Falstrom Co., Passaic, N. J.
Farrar & Trefts, Buffalo, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Flori Pipe Co., The, St. Louis, Mo.
Frank Heaters, Inc., Paterson, N. J.
Frick Co., Waynesboro, Pa.
Gehri Co., Tacoma, Wash.
Gerstein & Cooper Co., South Boston, Mass.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Goodrich Co., B. F., Akron, O. (Rubber lined)
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Hamburg Boiler Wks., Inc., Hamburg, Pa.
Harris & Co., Arthur, Chicago, Ill.
Heat Transfer Products, Inc., Carbondale, Pa.
Hodge Boiler Works, Boston, Mass.
Illinois Oil Co., Rock Island, Ill.
International Boiler Wks. Co., East Stroudsburg, Pa.
International Engineering Wks., Framingham, Mass.
● Kewanee Boiler Corp., Kewanee, Ill.
Kirk & Blum Mfg. Co., Cincinnati, O.
Knight, Maurice A., Akron, O.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
La Crosse Tractor Co., La Crosse, Wis.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Littleford Bros., Inc., Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Manitowoc Boiler Wks., Manitowoc, Wis.
Maysteel Products, Inc., Milwaukee, Wis.
Murray Iron Wks., Co., Burlington, Ia.
National Lead Co., New York, N. Y.
● National Radiator Co., The, Johnstown, Pa.
Newcomb Engineering Co., Grand Rapids, Mich.
Nooter Boiler Works, John, St. Louis, Mo.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Quaker City Iron Wks., Philadelphia, Pa.
Rheem Mfg. Co., New York, N. Y.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Rosebraugh Co., W. W., Salem, Ore.
Scaife Co., Oakmont, Pa.
Sims Co., Erie, Pa.
Southbridge Roofing Co., Inc., Southbridge, Mass.
Steinhorst & Sons, Inc., Emil, Utica, N. Y.
Strandwitz & Co., Inc., W. J., Camden, N. J.
Struthers Wells Corp., Titusville, Pa.
Tippett & Wood, Phillipsburg, N. J.
Trageser Copper Wks., Inc., Maspeth, Long Island, N. Y.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Vesco Corp., New York, N. Y.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Waterfilm Boilers, Inc., Jersey City, N. J.
Western Blower Co., Seattle, Wash.
● Whitlock Mfg. Co., Hartford, Conn.

TANKS, WASH, FOR CASTINGS

● Bell & Gossett Co., Morton Grove, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Nooter Boiler Works, John, St. Louis, Mo.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.

TEMPERATURE AND HUMIDITY CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

TEMPERATURE RECORDERS

See Recorders, Temperature

TEMPERATURE REGULATORS

See Regulators, Temperature

TEMPLATES, DRAWING, PIPING

Dietzgen Co., Eugene, Chicago, Ill.

TEST CHAMBERS

See Chambers, Test, Controlled Temperature and Humidity

TESTERS, GAGE, DEAD WEIGHT

Ashton Valve Co., Cambridge, Mass.
Dillon Co., Inc., W. C., Chicago, Ill.
Mansfield & Green, Cleveland, O.

THERMOMETERS, INDICATING, INDUSTRIAL

American Thermometer Co., St. Louis, Mo.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Dillon Co., Inc., W. C., Chicago, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Equipoise Controls, Mount Vernon, N. Y.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
● Gotham Instrument Co., Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon, Chicago, Ill.
● Illinois Testing Laboratories, Inc., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Co., Cincinnati (Norwood), O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Philadelphia Thermometer Co., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., New York, N. Y.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.
Wheelco Instruments Co., Chicago, Ill.

THERMOMETERS, INDICATING, REMOTE-READING

Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Fee & Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
● Gotham Instrument Co., Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hotstream Heater Co., Cleveland, O.
● Illinois Testing Laboratories, Inc., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Corp., Jas. P., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Co., Cincinnati, (Norwood), O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Philadelphia Thermometer Co., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., New York, N. Y.
Rochester Mfg. Co., Rochester, N. Y.
● Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.

THERMOMETERS, INDICATING, WALL

American Thermometer Co., St. Louis, Mo.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Fee & Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
● Gotham Instrument Co., Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Hill, E. Vernon, Chicago, Ill.
• Illinois Testing Laboratories, Inc., Chicago, Ill.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Co., Cincinnati (Norwood), O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Philadelphia Thermometer Co., Philadelphia, Pa.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., New York, N. Y.
Rochester Mfg. Co., Rochester, N. Y.
• Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y. (Effective temperature indicator)

THERMOMETERS, KATA

G. M. Mfg. Co., New York, N. Y.
Palmer Co., Cincinnati (Norwood), O.
Precision Thermometer & Instrument Co., Philadelphia, Pa.

THERMOSTATIC BELLOWS

See Bellows, Thermostatic and Metallic

THERMOSTATIC BI-METALS

See Bi-Metals, Thermostatic

THERMOSTATIC TRAPS

See Traps, Steam, Thermostatic

THERMOSTATS, DUCT TYPE

Armstrong Heat Control Co., Portland, Ore.
Atlas Valve Co., Inc., Newark, N. J.
• Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
• Detroit Lubricator Co., Detroit, Mich.
Douglass Automatic Controls Co., South Gate, Calif.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
• Henry Co., Paul, The, Controls Div., Los Angeles, Calif.
• Johnson Service Co., Milwaukee, Wis.
Leslie Co., Lyndhurst, N. J.
Mechanical Industries Production Co., Akron, O.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Moeller Instrument Co., Richmond Hills, N. Y.
Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
• Sarco Co., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Stevens Mfg. Co., Inc., Mansfield, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Tallmadge & Co., Webster, East Orange, N. J.
• Taylor Instrument Companies, Rochester, N. Y.
United Electric Controls Co., Boston, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
• Webster Tallmadge & Co., East Orange, N. J.
• White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, EFFECTIVE TEMPERATURE

Barber-Colman Co., Rockford, Ill.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Service Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Sarcotherm Controls, Inc., New York, N. Y.

THERMOSTATS, IMMERSION

American Instrument Co., Silver Spring, Md.
Armstrong Heat Control Co., Portland, Ore.
Atlas Valve Co., Inc., Newark, N. J.
• Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
• Detroit Lubricator Co., Detroit, Mich.
Douglass Automatic Controls Co., South Gate, Calif.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Fenwal, Inc., Ashland, Mass.
• General Controls Co., Glendale, Calif.
H-B Instrument Co., Philadelphia, Pa.
Hart Mfg. Co., Hartford, Conn.
• Henry Co., Paul, The, Controls Div., Los Angeles, Calif.
Industrial Engineering Corp., Terre Haute, Ind.
• Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Mechanical Industries Production Co., Akron, O.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Struthers Dunn, Inc., Philadelphia, Pa.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
United Electric Controls Co., Boston, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
Warren Electric Appliance Co., Warren, Pa.
White Mfg. Co., St. Paul, Minn.
• White-Rodgers Electric Co., St. Louis, Mo. (Hydraulic action)
Wilcolator Co., Elizabeth, N. J.

THERMOSTATS, RADIANT HEAT

• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., Chicago, Ill.

THERMOSTATS, ROOM OR WALL

Armstrong Heat Control Co., Portland, Ore.
• Autempco Corp., New York, N. Y.
• Automatic Products Co., Milwaukee, Wis.
Barber-Colman Co., Rockford, Ill.
Crise Mfg. Co., The, Columbus, O.
Crown Controls Co., New Breman, O.
• Detroit Lubricator Co., Detroit, Mich.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
• Fulton Sylphon Co., Knoxville, Tenn.
• General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
• Henry Co., Paul, The, Controls Div., Los Angeles, Calif.
Industrial Engineering Corp., Terre Haute, Ind.
• Johnson Service Co., Milwaukee, Wis.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Master Electric Co., Dayton, O.
McCorkle Co., D. H., Berkeley, Calif.
• Mercoid Corp., The, Chicago, Ill.
Miller Heat-O-Meter Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Co., Attleboro, Mass.
• Tallmadge & Co., Webster, East Orange, N. J.
• Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
United Electric Controls Co., Boston, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
• Webster Tallmadge & Co., East Orange, N. J.
White Mfg. Co., St. Paul, Minn.
• White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, SURFACE

Armstrong Heat Control Co., Portland, Ore.
• Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
• Detroit Lubricator Co., Detroit, Mich.
Fenwal, Inc., Ashland, Mass.
Hart Mfg. Co., Hartford, Conn.
• Henry Co., Paul, The, Controls Div., Los Angeles, Calif.
Industrial Engineering Corp., Terre Haute, Ind.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
McCorkle Co., D. H., Berkeley, Calif.
Mechanical Industries Production Co., Akron, O.
• Mercoid Corp., The, Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Penn Electric Switch Co., Goshen, Ind.
Perfex Corp., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Red Spot Electric Co., Tacoma, Wash.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Co., Attleboro, Mass.
Stevens Mfg. Co., Inc., Mansfield, O.
Struthers Dunn, Inc., Philadelphia, Pa.
Triplex Heating Specialty Co., Inc., Peru, Ind.
United Electric Controls Co., Boston, Mass.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.
White Mfg. Co., St. Paul, Minn.
• White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, TWO TEMPERATURE OR DUAL

Armstrong Heat Control Co., Portland, Ore.
• Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
• Detroit Lubricator Co., Detroit, Mich.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

● General Controls Co., Glendale, Calif.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
● Illinois Engineering Co., Chicago, Ill.
Industrial Engineering Corp., Terre Haute, Ind.
● Johnson Service Co., Milwaukee, Wis.
Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
● Mercoid Corp., The, Chicago, Ill.
Miller Heat-O-Meter Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Perfex Corp., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Ranco, Inc., Columbus, O.
Sampsel Time Control, Inc., Spring Valley, Ill.
● Sarco Co., Inc., New York, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
Tallmadge & Co., Webster, East Orange, N. J.
United Electric Controls Co., Boston, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
Webster Tallmadge & Co., East Orange, N. J.
● White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, WEATHER COMPENSATING

● Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
● Detroit Lubricator Co., Detroit, Mich.
Heat Timer Corp., New York, N. Y.
● Illinois Engineering Co., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Lawler Automatic Controls, Mount Vernon, N. Y.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Miller Heat-O-Meter Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
● Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
● Tallmadge & Co., Webster, East Orange, N. J.
● Thrush & Co., H. A., Peru, Ind.
United Electric Controls Co., Boston, Mass.
● Weather Controls Div., Automatic Devices Co., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.
● Webster Tallmadge & Co., East Orange, N. J.

TIME SWITCHES

See Switches, Time

TOGGLE BOLTS

See Bolts, Toggle and Anchor

TONGS, PIPE

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Trimont Mfg. Co., Boston, Mass.
Williams & Co., J. H. Buffalo, N. Y.

TOOLS (CHISELS, PLIERS, SCREW DRIVERS, ETC.)

Acme Steel Co., Chicago, Ill. (Strapping tools for holding insulation in place on ducts, pipes, tanks, etc.)
Bernz Co., Inc., Otto, Rochester, N. Y.
Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Crescent Tool Co., Jamestown, N. Y.
Everhot Products Co., Chicago, Ill.
Greene, Tweed & Co., New York, N. Y.
Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Hartwell Engineering Co., Los Angeles, Calif. (Numerous production tools, drill protectors and depth gages, etc.)
International Nutyp Tool Co., Oswego, N. Y.
Interstate Sales Co., New York, N. Y. (Protractor for layout work)
Mid-States Equipment Co., Chicago, Ill. (Saw gun)
Millers Falls Co., Greenfield, Mass.
Morey, Dan, Los Angeles, Calif.
Parker-Kalon Corp., New York, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Persson Co., T. G., Bloomfield, N. J. (flange jacks)
Rawlplug Co., Inc., The, New York, N. Y. (drills for masonry)
Richmont, Inc., Los Angeles, Calif.
Schild Mfg. Co., Milwaukee, Wis.
Snap-On Tools Corp., Kenosha, Wis.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Thompson & Son Co., The Henry G., New Haven, Conn.
Walton Co., Hartford, Conn. (Tap extractors)
Williams & Co., J. H., Buffalo, N. Y.

TOOLS, FLARING, FOR TUBING

Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Dudgeon, Inc., Richard, New York, N. Y.
Everhot Products Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Leonard Precision Products Co., Garden Grove, Calif.
Parker Appliance Co., The, Cleveland, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Weatherhead Co., Cleveland, O.

TORCHES, BRAZING AND SOLDERING

Aeroil Products Co., West New York, N. J.
Air Reduction Sales Co., New York, N. Y.
Atkins & Co., E. C., Indianapolis, Ind.
Bernz Co., Inc., Otto, Rochester, N. Y.
Black Mfg. Co., The, Baltimore, Md.
Borm Mfg. Co., Elgin, Ill.
Century Aircraft Co., Inglewood, Calif.
● Clayton & Lambert Mfg. Co., Detroit, Mich.
Dockson Corp., Detroit, Mich.
Eclipse Fuel Engineering Co., Rockford, Ill.
Ergolyte Mfg. Co., Philadelphia, Pa.
General Scientific Equipment Co., Philadelphia, Pa.
Harris Calorific Co., The, Cleveland, O.
Ideal Industries, Inc., Sycamore, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Insto-Gas Corp., Detroit, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Mid States Equipment Co., Chicago, Ill.
Minn-Kota Foundry & Mfg. Co., Fargo, N. D.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
National Pumpless Blowtorch Co., Cleveland, O.
Powder Weld Co., Brooklyn, N. Y.
Reiner & Campbell Co., Inc., Elizabeth, N. J.
Sac Tool Mfg. Co., St. Louis, Mo.
Sight Feed Generator Co., Richmond, Ind.
Smith Welding Equipment Corp., Minneapolis, Minn.
Torchweld Equipment Div., National Cylinder Gas Co., Chicago, Ill.
Torit Mfg. Co., St. Paul, Minn.
Trindl Products, Ltd., Chicago, Ill.
Turner Brass Works, The, Sycamore, Ill.
Victor Equipment Co., San Francisco, Calif.
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.
Welding Apparatus Co., Chicago, Ill.
Will-Weld Mfg. Co., Inc., Omaha, Neb.

TORQUE INDICATING WRENCHES

See Wrenches, Torque Indicating

TOWERS, COOLING, ATMOSPHERIC

American Cooling Tower Co., Kansas City, Mo.
Binks Mfg. Co., Chicago, Ill.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Doyle & Roth Mfg. Co., Newark, N. J.
Fluor Corp., Ltd., The, Los Angeles, Calif.
Foster Wheeler Corp., New York, N. Y.
● Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
Marley Co., Inc., Kansas City, Kan.
National Engineering & Mfg. Co., Kansas City, Mo.
● New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
● Pritchard & Co., J. F., Kansas City, Mo.
● Spraying Systems Co., Chicago, Ill.
Stewart Ice Machine Co., Los Angeles, Calif.
Thermal Industries, Indio, Calif.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Young Radiator Co., Racine, Wis. (radiator type)

TOWERS, COOLING, MECHANICAL DRAFT

American Cooling Tower Co., Kansas City, Mo.
Binks Mfg. Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Newark, N. J.
Fluor Corp., Ltd., The, Los Angeles, Calif.
Foster Wheeler Corp., New York, N. Y.
● Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
Marley Co., Inc., Kansas City, Kan.
● Marlo Coil Co., St. Louis, Mo.
● Murray Mfg. Co., D. J., Wausau, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
● New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
● Pritchard & Co., J. F., Kansas City, Mo.
Rogers Companies, Inc., R. B., (Rogers-Research Div.) New York, N. Y.
Thermal Industries, Indio, Calif.
● Trane Co., The, LaCrosse, Wis.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.

TRANSFORMERS, ELECTRIC

Arjac Products Inc., Rochester, N. Y.
Armstrong Heat Control Co., Portland, Ore.
Bogue Electric Co., Paterson, N. J.
Davis & Co., Inc., Dean W., Kentland, Ind.
Eisler Engineering Corp., Newark, N. J.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Jefferson Electric Co., Bellwood, Ill.
Master Electric Co., Aircraft & Electric Controls Div., Dayton, O.
Sola Electric Co., Chicago, Ill.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

• Wagner Electric Corp., St. Louis, Mo.
Webster Electric Co., Racine, Wis.
West Coast Electrical Mfg. Co., Los Angeles, Calif.

TRANSMISSION DRIVES

See Drives, Chain, Flat Belt and V-Belt

TRAPS, STEAM, MECHANICAL

American District Steam Co., North Tonawanda, N. Y.
• Anderson Co., V. D., The, Cleveland, O.
• Armstrong Machine Wks., Three Rivers, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Boylston Steam Specialty Co., Chicago, Ill.
Bundy Steam Trap Co., Nashua, N. H.
Burrows Mfg. Co., F. A., York, Pa.
Cashin Co., W. D., Boston, Mass.
• Clark Mfg. Co., Cleveland, O.
Coe Mfg. Co., Painesville, O.
• Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
Davis Engineering Corp., Elizabeth, N. J.
Davis Regulator Co., Chicago, Ill.
• Dunham Co., C. A., Chicago, Ill.
Ellis Drier Co., C. A., Chicago, Ill.
• Fisher Governor Co., Marshalltown, Ia.
• Haines & Co., William S., Philadelphia, Pa. (Combination float & thermostatic)
Healy Ruff Co., St. Paul, Minn.
• Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
• Illinois Engineering Co., Chicago, Ill.
• Johnson Corp., Three Rivers, Mich.
Justus Steam Trap Co., Napanoch, N. Y.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
McAuley Trap Co., Pittsburgh, Pa.
• Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Mouat Vapor Heating Co., The, Cleveland, O.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nason Co., Detroit, Mich.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
• Sarco Co., Inc., New York, N. Y.
• Schaub Engineering Co., Fred H., Chicago, Ill.
Squires Co., C. E., Cleveland, O.
Sterling, Inc., Milwaukee, Wis.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
Swendeman, Inc., Boston, Mass.
Templeton Bros., Hyde Park, Mass. (Return)
Templeton Mfg. Co., Hyde Park, Mass.
• Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Specialty Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
• Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich. (Combination)
• Yarnall-Waring Co., Philadelphia, Pa.

TRAPS, STEAM, THERMOSTATIC

American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Inc., Jamaica Plain, Boston, Mass.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Cryer Trap & Valve Co., Inc., New York, N. Y.
• Dunham Co., C. A., Chicago, Ill.
• Haines & Co., William S., Philadelphia, Pa.
• Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
• Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Marsh Heating Equipment Co, Div. of Jas. P. Marsh Corp., Chicago, Ill.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Powers Regulator Co., Chicago, Ill.
• Sarco Co., Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling, Inc., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Swartwout Co., Cleveland, O.
• Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Car Heating Co., Inc., Chicago, Ill.
Vapor Specialty Co., New York, N. Y.
• Webster & Co., Warren, Camden, N. J.

TREATMENT, STEAM SYSTEM, TO INHIBIT CORROSION

Ampion Corp., Long Island City, N. Y.
• Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
• Apex Engineering Co., Chicago, Ill.
Aquatic Chemical Laboratories, Inc., New York, N. Y.
Calgon, Inc., Pittsburgh, Pa.
Cannon Chemical Co., Inc., Everett, Mass.
Elgin Softener Corp., Elgin, Ill.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Haering & Co., Inc., D. W., Chicago, Ill.
% Proportioneers, Inc. %, Providence, R. I.
Rid-Sludge Div., Aulwood Mfg. Co., St. Paul, Minn. (vapor treatment to remove sludge from heating system)
Saverite Engineering Co., Hoboken, N. J.
Turco Products, Inc., Los Angeles, Calif.
Vinco Co., Inc., The, New York, N. Y.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
Whiting Stoker Sales Co., Chicago, Ill.
• X Laboratories, Inc., New York, N. Y.

TREATMENT, WATER, TO INHIBIT CORROSION

Activator Process Sales Co., Alhambra, Calif.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American K. A. T. Corp., New York, N. Y.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
• Anderson-Stolz Corp., Kansas City, Mo.
Aquatic Chemical Laboratories, Inc., New York, N. Y.
Automatic Pump & Softener Corp., Rockford, Ill.
Bogue Electric Co., Paterson, N. J.
Calgon, Inc., Pittsburgh, Pa.
• Cannon Chemical Co., Everett, Mass.
Cochrane Corp., Philadelphia, Pa.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
• Dowell Inc., Tulsa, Okla.
Elgin Softener Corp., Elgin, Ill.
Ferro-Nil Corp., New York, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
General Ozone Corp., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Grief, Edward C., Bogota, N. J.
Haering & Co., D. W., Chicago, Ill.
• Hagan Corp., Pittsburgh, Pa.
Maintenance Engineering Corp., Houston, Tex.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Monsanto Chemical Co., Organic Chemicals Div., St. Louis, Mo.
Mutual Chemical Co. of America, New York, N. Y.
National Aluminate Corp., Chicago, Ill.
North American Fibre Products Co., The, Cleveland, O.
Norwood Filtration Co., The, Florence, Mass.
Oakite Products, Inc., New York, N. Y.
% Proportioneers, Inc., %, Providence, R. I.
Permutit Co., New York, N. Y.
Refinite Corp., Omaha, Nebr.
• Research Products Corp., Madison, Wis.
Saverite Engineering Co., Hoboken, N. J.
Solvay Sales Corp., New York, N. Y.
Sudbury Laboratory, South Sudbury, Mass.
Turco Products, Inc., Los Angeles, Calif.
Uniflow Mfg. Co., Erie, Pa.
Vinco Co., Inc., The, New York, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Water Refining Co., Ft. Wayne, Ind.
Water Service Laboratories, Inc., New York, N. Y.
Water Treatment Company of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
Whiting Stoker Sales Co., Chicago, Ill.
• Worthington Pump & Machinery Corp., Harrison, N. J.
• X Laboratories, Inc., New York, N. Y.

TREATMENT, WATER, FOR SLIME AND ALGAE CONTROL

Ampion Corp., Long Island City, N. Y.
• Anderson-Stolz Corp., Kansas City, Mo.
Aquatic Chemical Laboratories, Inc., New York, N. Y.
Carolina Aniline & Extract Co., Inc., Charlotte, N. C.
• Condenser Service & Engineering Co., Inc., Hoboken, N. J.
• Dowell Inc., Tulsa, Okla.
Haering & Co., Inc., D. W., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Aluminate Corp., Chicago, Ill.
Oakite Products, Inc., New York, N. Y.
% Proportioneers, Inc., %, Providence, R. I.
Refinite Corp., Omaha, Nebr.

Wallace & Tiernan Co., Inc., Newark, N. J.
Western Chemical Co., Kansas City, Mo.

TRY-COCKS, BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Eclipse Fuel Engineering Co., Rockford, Ill.
Keckley Co., O. C., Chicago, Ill.
Reliance Gauge Column Co., Cleveland, O.

TUBE CLEANERS

See Cleaners, Tube

TUBES, BOILER

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Standard Tube Co., Highland Park, Mich.
Steel & Tubes Div., Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.

TUBES, CONDENSER

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
Bundy Tubing Co., Detroit, Mich.
Detroit Seamless Steel Tubes Co., Detroit, Mich.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
● Revere Copper and Brass Incorporated, New York, N. Y.
Standard Tube Co., Highland Park, Mich.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.
● Wolverine Tube Div. of Calumet & Hecla Consolidated Copper Co., Detroit, Mich.

TUBES, PITOT

Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Hill, E. Vernon, Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.

TUBING, ALUMINUM

● Aluminum Co. of America, Pittsburgh, Pa.
● Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
● Revere Copper and Brass Incorporated, New York, N. Y.

TUBING BENDERS

See Benders, Tubing

TUBING, BRASS AND COPPER

● American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Everhot Products Co., Chicago, Ill.
Hussey & Co., C. G., Pittsburgh, Pa.
● Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
● Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., New York, N. Y.
● Revere Copper and Brass Incorporated, New York, N. Y.
Roberts Tube Works, Detroit, Mich.
● Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

TUBING CUTTERS

See Cutters, Tubing

TUBING, FINNED

Aerofin Corp., Syracuse, N. Y.
Brown Fintube Co., The, Elyria, O.
● Bush Mfg. Co., Hartford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Newark, N. J.
● Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
G. & O. Mfg. Co., New Haven, Conn.
Griscom-Russell Co., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kramer Trenton Co., Trenton, N. J.
● McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Tenney Engineering, Inc., Newark, N. J.
Vapor Car Heating Co., Inc., Chicago, Ill.
● Wolverine Tube Div. of Calumet and Hecla Consolidated Copper Co., Detroit, Mich. (Aluminum, copper)

TUBING, MAGNESIUM

Dow Chemical Co., The, Midland, Mich.
● Revere Copper and Brass Incorporated, New York, N. Y.

TUBING, NICKEL AND NICKEL ALLOY

Agaloy Tubing Co., Springfield, O.
Bridgeport Brass Co., Bridgeport, Conn.
Bundy Tubing Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
● Globe Steel Tubes Co., Milwaukee, Wis.
International Nickel Co., New York, N. Y.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
● Revere Copper and Brass Incorporated, New York, N. Y.

TUBING, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Extruded Plastics, Inc., Norwalk, Conn.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Goodrich Co., B. F., Akron, O.
Irvington Varnish and Insulator Co., Irvington, N. J.
Mills Corp., Elmer E., Chicago, Ill.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Parker Appliance Co., The, Cleveland, O.
Resistoflex Corp., Belleville, N. J.
Sandee Mfg. Co., Chicago, Ill.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

TUBING, SILVER CLAD AND SILVER ALLOY

General Plate Div., Metals & Controls Corp., Attleboro, Mass.

TUBING, STEEL, ALLOY, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Detroit Seamless Steel Tubes Co., Detroit, Mich.
● Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp. Subsidiary, Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.
● Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, ALLOY, WELDED

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Duraloy Co., Scottdale, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
● Revere Copper and Brass Incorporated, New York, N. Y.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Standard Tube Co., Highland Park, Mich.
Steel and Tubes Div., Republic Steel Corp., Cleveland, O.
Trent Tube Mfg. Co., East Troy, Wis.
● Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Detroit Seamless Steel Tubes Co., Detroit, Mich.
● Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Steel & Tube Div., Canton, O.
● Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, WELDED

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.
Bundy Tubing Co., Detroit, Mich.
Everhot Products Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
● Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Tube Co., Pittsburgh, Pa.
● Revere Copper and Brass Incorporated, New York, N. Y.
South Chester Tube Co., Chester, Pa.
● Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Standard Tube Co., Highland Park, Mich.
Steel and Tubes Div., Republic Steel Corp., Cleveland, O.
● Wheatland Tube Co., Philadelphia, Pa.
● Youngstown Sheet & Tube Co., Youngstown, O.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

TURBINES, MECHANICAL DRIVE

• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Carling Blower Co., Worcester, Mass.
Coppus Engineering Corp., Worcester, Mass.
Dean Hill Pump Co., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
Elliott Co., Jeannette, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Moore Steam Turbine Div., Worthington Pump and Machine Corp., Wellesville, N. Y.
Murray Iron Wks. Co., Burlington, Ia.
• Pyle-National Co., The, Chicago, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Terry Steam Turbine Co., Hartford, Conn.
• Wing Mfg. Co., L. J., New York, N. Y.

2, 3 AND 4-WAY VALVES

See Valves, 2, 3 and 4-way

UNDERGROUND PIPING

See Conduit, Underground Piping

UNDERWATER HEATERS

See Heaters, Steam Jet, for Liquids

UNIONS, BRASS

Acheson Mfg. Co., Rankin, Pa.
Bowser, Inc., Fort Wayne, Ind
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
• Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
• General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Kennedy Valve Mfg. Co., The, Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Lunkenheimer Co., Cincinnati, O.
• Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Phoenix Brass Fittings Corp., Irvington, N. J.
Powell Co., Wm., Cincinnati, O.
Rhode Island Fittings Co., Hillsgrove, R. I.
Schaible Co., The, Cincinnati, O.
Union Metal Works, Chelsea, Mass.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburg, Pa.

UNIONS, MALLEABLE, BRASS SEAT

Corley Co., Jersey City, N. J.
• Crane Co., Chicago, Ill.
Dart Mfg. Co., E. M., Providence, R. I.
Detroit Brass & Malleable Wks., Detroit, Mich.
Fairbanks Co., New York, N. Y.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
• General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
• Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Jefferson Union Co., Inc., New York, N. Y.
• Kennedy Valve Mfg. Co., The, Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Malleable Iron Fittings Co., Branford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Rhode Island Fittings Co., Hillsgrove, R. I.
Rockwood Sprinkler Co., Worcester, Mass.
Star Mfg. Co., Inc., Providence, R. I.
Stockham Pipe Fittings Co., Birmingham, Ala.
• Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburg, Pa.

UNIONS, ORIFICE

Catawissa Valve & Fittings Co., Catawissa, Pa.
Conoflow Corp., Philadelphia, Pa.
Hamer Oil Tool Co., Long Beach, Calif.
• Watson-Stillman Co., Roselle, N. J.

UNIONS, STEEL

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Catawissa Valve & Fittings Co., Catawissa, Pa.
Champion Machine & Forging Co., Cleveland, O.
• Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Frick Co., Waynesboro, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
• Henry Valve Co., Chicago, Ill.
Rockwood Sprinkler Co., Worcester, Mass.
Roessing Mfg. Co., Pittsburgh, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J.

UNIT COOLERS

See Coolers, Unit

UNIT HEATERS

See Heaters, Unit

UNIT VENTILATORS

See Ventilators, Unit

UNITS, AIR CONDITIONING, CENTRAL STATION TYPE

Self contained blower, heating and/or cooling coil, filter, humidifier unit for remote location and duct air distribution

• Air & Refrigeration Corp., New York, N. Y.
• Airtemp, Div. of Chrysler Corp., Dayton, O.
• Allis-Chalmers Mfg. Co., Milwaukee, Wis.
• American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
• American Thermal Industries, Detroit, Mich.
Anetsberger Bros., Chicago, Ill.
Bahnson Co., Winston-Salem, N. C.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Beacon-Morris Corp., Boston, Mass. (Custom built)
Bryant Heater Co., The, Cleveland, O.
• Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Eckhart Mfg. Co., Roselle Park, N. J.
• Fedders Mfg. Co., Inc., Buffalo, N. Y.
Forman Air Conditioning & Engrg. Co., New York, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
• Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Howe Ice Machine Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
• Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Manufacturers Fin Coil Co., Chicago, Ill
• Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Micheli Air Conditioning Co., Inc., Schenectady, N. Y.
Niagara Blower Co., New York, N. Y.
Palmer Mfg. Corp., Phoenix, Ariz.
Parks-Cramer Co., Fitchburg, Mass.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Surface Combustion Corp., Toledo, O.
• Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
• Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigeration Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, HORIZONTAL PACKAGE TYPE

Self contained blower, cooling and/or heating coil, filter, humidifier unit for ceiling or platform location in space conditioned, for connection to remote compressor or cold water supply, and steam or hot water

• Airtemp, Div. of Chrysler Corp., Dayton, O.
• American Blower Corp., Detroit, Mich.
• American Thermal Industries, Detroit, Mich.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Beacon-Morris Corp., Boston, Mass. (Custom built)
Bryant Heater Co., The, Cleveland, O.
• Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Champion Unit Heater Co., Chicago, Ill.
• Clarage Fan Co., Kalamazoo, Mich.
Conditionaire Unit Co., Chicago, Ill.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
• Fedders Mfg. Co., Inc., Buffalo, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
• Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

● Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
Kramer Trenton Co., Trenton, N. J.
Manufacturers Fin Coil Co., Chicago, Ill.
● Marlo Coil Co., St. Louis, Mo.
Mayflower Air-Conditioners, Inc., St. Paul, Minn.
McQuay, Inc., Minneapolis, Minn.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Stainless & Steel Products Co., St. Paul, Minn.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Trane Co., The, La Crosse, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
● Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, INDUSTRIAL TYPE

● Air & Refrigeration Corp., New York, N. Y.
Allen Corp., Detroit, Mich. (Make-up air units)
● American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
● American Thermal Industries, Detroit, Mich.
Anetsberger Bros., Chicago, Ill.
Bahnson Co., Winston-Salem, N. C.
● Baker Ice Machine Co., Inc., Omaha, Neb.
Beacon-Morris Corp., Boston, Mass. (Custom built)
Bryant Heater Co., The, Cleveland, O.
● Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
● Clarage Fan Co., Kalamazoo, Mich.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
● Curtis Refrigeration Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Inc., Chicago, Ill.
● Fedders Mfg. Co., Inc., Buffalo, N. Y.
Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
● Governair Corp., Oklahoma City, Okla.
Howe Ice Machine Co., Chicago, Ill.
Ice-Air Conditioning Corp., Brooklyn, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
● Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
Lintern Co., Berea, O.
Manufacturers Fin Coil Co., Chicago, Ill.
● Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
New York Blower Co., Chicago, Ill. (Make-up air units)
Niagara Blower Co., New York, N. Y.
Norwood Filtration Co., The, Florence, Mass.
Parks-Cramer Co., Fitchburg, Mass.
Peerless of America, Inc., Chicago, Ill.
Pfening Co., Fred D., Columbus, O.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
● Rempe Co., Chicago, Ill.
Rogers Companies, Inc., R. B., (Rogers-Research Div.) New York, N. Y.
● Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Somers, Inc., H. J., Detroit, Mich.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Surface Combustion Corp., Toledo, O.
Tenney Engineering, Inc., Newark, N. J. (Including test chambers)
● Trane Co., The, La Crosse, Wis.
Vilter Mfg. Co., Milwaukee, Wis.
● Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, REVERSE REFRIGERATION CYCLE

Doyle & Roth Mfg. Co., Newark, N. J.
Drayer & Hanson, Inc., Los Angeles, Calif.
Muncie Gear Works, Inc., Muncie, Ind.
Terra-Temp Co., Inc., Indianapolis, Ind.

UNITS, AIR CONDITIONING, SUMMER, EVAPORATIVE COOLING TYPE

For cooling with sprays, no dehumidification

● Air & Refrigeration Corp., New York, N. Y.
Alton Mfg. Co., Dallas, Tex.
● American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Metal Products Co., Fort Worth, Tex.
● Annis Air Filters, Glendale, Calif.
April Showers Co., Washington, D. C.
Aqua-Mist Co., Topeka, Kans.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Bahnson Co., Winston-Salem, N. C.
Beckett & Co., Thomas, Dallas, Tex.
Bien Air Conditioning Co., Monterey Park, Calif.
Campbell Heating Co., E. K., Kansas City, Mo.
Carrier Corp., Syracuse, N. Y.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dallas Engineering Co., Inc., Dallas, Tex.
Doyle & Roth Mfg. Co., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Essick Mfg. Co., Los Angeles, Calif.
Farr Co., Los Angeles, Calif.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Great National Air Conditioning Co., Dallas, Tex.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
International Sales Co., San Francisco, Calif.
Martin Fan & Blower Co., Chicago, Ill.
Montag Stove & Furnace Works, Portland, Ore.
Morey, Dan, Los Angeles, Calif. (mats for evaporative coolers)
Mountain States Equipment Co., Denver, Colo.
National Engineering & Mfg. Co., Kansas City, Mo.
Niagara Blower Co., New York, N. Y.
Palmer Mfg. Co., Phoenix, Ariz.
Peerless of America, Inc., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Rheem Mfg. Co., New York, N. Y.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Royal Heaters, Inc., Alhambra, Calif.
Steamaire Co., Cincinnati, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Western Blower Co., Seattle, Wash.
X L Refrigerating Co., Chicago, Ill.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, REMOTE COMPRESSOR OR COLD WATER, UNDER 3 TONS CAPACITY

Self contained blower, coil, filter unit for connection to remote compressor or cold water supply

● Airtemp, Div. of Chrysler Corp., Dayton, O.
American Coils Inc., Newark, N. J.
Carrier Corp., Syracuse, N. Y.
Doyle & Roth Mfg. Co., Newark, N. J.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Giant Mfg. Co., Council Bluffs, Ia.
Hastings Air Conditioning Co., Hastings, Neb.
● Ilg Electric Ventilating Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
● Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
McQuay, Inc., Minneapolis, Minn.
Norwin Co., Freeport, Ill.
Peerless of America, Inc., Chicago, Ill.
Premier Furnace Co., Dowagiac, Mich.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Scott-Newcomb, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Duluth, Minn.
● United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, UNDER 3 HP

Self contained blower, coil, compressor, filter unit

● Airtemp, Div. of Chrysler Corp., Dayton, O.
Carrier Corp., Syracuse, N. Y.
Controldtemp Equipment Sales Corp., Brooklyn, N. Y.
Doyle & Roth Mfg. Co., Newark, N. J.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Ice Cooling Appliance Corp., Morrison, Ill. (Ice)
● Ilg Electric Ventilating Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Pacific Mfg. Corp., Cleveland, O. (Window type)

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Peerless of America, Inc., Chicago, Ill.
Philco Corp., Philadelphia, Pa.
Pleasantaire Corp., Washington, D. C. (Window type)
Premier Furnace Co., Dowagiac, Mich.
Scott-Newcomb, Inc., St. Louis, Mo.
• United States Air Conditioning Corp., Minneapolis, Minn.
• Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, STORE TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, 3 HP AND OVER

Self contained blower, coil, compressor, filter unit with air discharge approximately 6 ft. above floor

• Airtemp, Div. of Chrysler Corp., Dayton, O.
• American Thermal Industries, Detroit, Mich.
• Baker Ice Machine Co., Inc., Omaha, Neb.
Carrier Corp., Syracuse, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Controldtemp Equipment Sales Corp., Brooklyn, N. Y.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
Forman Air Conditioning & Engrg. Co., New York, N. Y.
Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
• Governair Corp., Oklahoma City, Okla.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Nevinger Mfg. Co., Inc., Greenville, Ill.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Remington Corp., Cortland, N. Y.
Scott-Newcomb, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
• Trane Co., The, La Crosse, Wis.
• United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Co., Cleveland, O.
• Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, WINTER, ROOM TYPE, FLOOR CABINET

Self contained blower, filter, heating coil, humidifier unit

• Air & Refrigeration Corp., New York, N. Y.
Aladdin Heating Corp., Oakland, Calif.
Auburn Burner Co., Auburn, Ind.
Bryant Heater Co., The, Cleveland, O.
• Campbell Heating Co., Des Moines, Ia.
Carrier Corp., Syracuse, N. Y.
Circulators & Devices Mfg. Corp., New York, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
Dalzen Tool & Mfg. Co., Detroit, Mich.
Doyle & Roth Mfg. Co., Newark, N. J.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
• Ilg Electric Ventilating Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kelm Corp., The, Chicago, Ill.
• Kennard Corp., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Rernor Mfg. Co., Mercer, Pa.
Richmond Radiator Co., Gas Products Div., New York, N. Y.
Somera, Inc., H. J., Detroit, Mich.
Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Surface Combustion Corp., Toledo, O.
• Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Duluth, Minn.
• United States Air Conditioning Corp., Minneapolis, Minn.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, YEAR AROUND, ROOM TYPE, FLOOR CABINET

Self contained blower, cooling and heating coil, filter, humidifier unit for connection to remote compressor or cold water supply, and steam or hot water supply

• Air & Refrigeration Corp., New York, N. Y.
• Airtemp, Div. of Chrysler Corp., Dayton, O.
American Coils, Inc., Newark, N. J.
Beacon-Morris Corp., Boston, Mass. (Custom built)
Carrier Corp., Syracuse, N. Y.
• Clarage Fan Co., Kalamazoo, Mich.
• Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Doyle & Roth Mfg. Co., Newark, N. J.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Hastings Air Conditioning Co., Hastings, Neb.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
• Ilg Electric Ventilating Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Johnson Co., S. T., Oakland, Calif.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kelvinator Div., Nash-Kelvinator Corp., Detroit, Mich.
• Kennard Corp., St. Louis, Mo.
Kramer Trenton Co., Trenton, N. J.
• Marlo Coil Co, St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
• Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Duluth, Minn.
York Corp., York, Pa.

UNITS, STERILIZING, AIR

Rogers Companies, Inc., R. B. (Rogers-Research Div.) New York, N. Y.

UNITS, WINDOW VENTILATOR AND FILTER

Airgard Mfg. Co., Chicago, Ill.
American Air Conditioning Co., Detroit, Mich.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Carrier Corp., Syracuse, N. Y.
Circulators & Devices Mfg. Corp., New York, N. Y.
Connor Engineering Corp., W. B., New York, N. Y.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
• Ilg Electric Ventilating Co., Chicago, Ill.
Kaiser Co., H. S., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Mellish & Murray Co., Chicago, Ill.
Pacific Mfg. Corp., Cleveland, O.
Reed Unit-Fans, Inc., New Orleans, La.
Reliable Sheet Metal Engineering Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Somera Inc., H. J., Detroit, Mich.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Unified Air Conditioner Co., Duluth, Minn.
• United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
York Corp., York, Pa.

UNIVERSAL JOINTS

See Joints, Universal, for Operating Valves

VACUUM CLEANERS FOR BOILERS

See Cleaners, Vacuum, for Boilers

VACUUM GAGES

See Gages, Indicating, Vacuum

VACUUM HEATING SYSTEMS

See Systems, Heating, Vacuum

VACUUM PUMPS

See Pumps, Vacuum

VACUUM RECORDERS

See Recorders, Pressure and Vacuum

VALVE OPERATORS

See Operators, Valve

VALVE RESEATERS

See Reseaters, Valve

VALVES, AIR OPERATING

Bailey Co., Chas. M., San Francisco, Calif.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
Darling Valve & Mfg., Co., Williamsport, Pa.
• Gotham Instrument Co., Inc., New York, N. Y.
Hunt & Son, Inc., H. B. Salem, O.
• Illinois Engineering Co., Chicago, Ill.
Leslie Co., Lyndhurst, N. J.

VALVES, ANGLE

Albright Equipment Co., Johnstown, Pa.
Alloy Steel Products Co., Linden, N. J., (Stainless steel)
• American Brass Co., Waterbury, Conn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Co., H., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa. (Plug)
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
Central Brass Mfg. Co., Cleveland, O.
Chapman Valve Mfg. Co., The Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Clayton Mfg. Co., Alhambra, Calif.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Edward Valves, Inc., East Chicago, Ind.
Fairbanks Co., New York, N. Y.
Farris Engineering Co., Palisades Park, N. J.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

● Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Kitson Co., Philadelphia, Pa.
Klingerit, Inc., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse, Inc., Watertown, Mass.
● Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ohio Pattern Wks. & Foundry Co., Cincinnati, O.
O'Malley Valve Co., Edward, Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling, Inc., Milwaukee, Wis.
Stockham Pipe Fittings Co., Birmingham, Ala.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J. (hydraulic service)
White Flo-Matic Corp., Hoosick Falls, N. Y.
Williams Valve Co., D. T., Cincinnati, O.

VALVES, BALANCING, RADIATOR, FOR FORCED HOT WATER HEATING SYSTEMS

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
● Gotham Instrument Co., Inc., New York, N. Y.
Hammond Brass Works, Hammond, Ind.
Marsh Valve Co., Dunkirk, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
● Trane Co., The, La Crosse, Wis.

VALVES, BLOW-OFF

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Babcock & Wilcox Co., New York, N. Y.
Barrett Machine Co., N. S., Pittsburgh, Pa.
Bordo Co., Inc., L. J., Glenside, Pa.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cochrane Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Edward Valves, Inc., East Chicago, Ind.
Elliott Co., Jeannette, Pa.
Everlasting Valve Co., Jersey City, N. J.
Fairbanks Co., New York, N. Y.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
Keckley Co., O. C., Chicago, Ill.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
● McDonnell & Miller, Inc., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Ohio Injector Co., Wadsworth, O.
O'Malley Valve Co., Edward, Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Powell Co., Wm., Cincinnati, O.
Schade Valve Co., Philadelphia, Pa.
● Walworth Co., New York, N. Y.
● Yarnall-Waring Co., Philadelphia, Pa.

VALVES, CHECK

Aeroquip Corp., Jackson, Mich.
Albright Equipment Co., Johnstown, Pa.
Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Hard Rubber Co., New York, N. Y. (Rubber lined)
Barrett, Haentjens & Co., Hazleton, Pa.
Belfield Co., H., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Clayton Mfg. Co., Alhambra, Calif.
Cochrane Corp., Philadelphia, Pa.
Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Electric Sprayit Co., The, Sheboygan, Wis.
Fairbanks Co., New York, N. Y.
Foster Engineering Co., Newark, N. J.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
● Grinnell Co., Inc., Providence, R. I.
Hammond Brass Works, Hammond, Ind.
Harman Equipment Co., Los Angeles, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
● Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J., (Hard rubber)
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mansfield & Green, Cleveland, O.
● Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
● Mueller Brass Co., Port Huron, Mich.
Norgren Co., C. A., Denver, Colo.
Northern Indiana Brass Co., Elkhart, Ind.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ohio Pattern Wks. & Foundry Co., Cincinnati, O.
O'Malley Valve Co., Edward, Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Ruggles-Kingemann Mfg. Co., Salem, Mass. (Bleeder type)
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Smolensky Valve Co., Inc., Bedford, O.
Stockham Pipe Fittings Co., Birmingham, Ala.
Stokes Molded Products, Trenton, N. J. (Hard rubber)
Strong, Carlisle & Hammond Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J. (hydraulic service)
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Gauge Co., Pittsburgh, Pa. (Noiseless)
Williams Valve Co., D. T., Cincinnati, O.

VALVES, COMPRESSOR

Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clayton Mfg. Co., Alhambra, Calif.
Detroit Stamping Co., Detroit, Mich.
Frick Co., Waynesboro, Pa.
● Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
● Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Mueller Brass Co., Port Huron, Mich.
Ohio Injector Co., Wadsworth, O.
Voss Co., J. H. H., New York, N. Y.

VALVES, DIAPHRAGM

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Atlas Valve Co., Inc., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Belfield Co., H., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., Waterbury, Conn.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Reading, Pa.
Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Co., Palisades Park, N. J.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Foxboro Co., Foxboro, Mass.
Gates Engineering Co., Wilmington, Del.
● General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
● Grinnell Co., Providence, R. I.
● Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
● Henry Valve Co., Chicago, Ill.
Hunt & Son, Inc., H. B., Salem, O.
● Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.

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● Kieley & Mueller, Inc., North Bergen, N. J.
Kitson Co., Philadelphia, Pa.
Klipfel Mfg. Co., Hamilton, O.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
Leslie Co., Lyndhurst, N. J.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Mueller Brass Co., Port Huron, Mich.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Norgren Co., C. A., Denver, Colo.
Parks-Cramer Co., Fitchburg, Mass.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Powers Regulator Co., Chicago, Ill.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Kingemann Mfg. Co., Salem, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Spence Engineering Co., Inc., Walden, N. Y.
Staples & Pfeiffer, San Francisco, Calif.
Sterling, Inc., Milwaukee, Wis.
Swartwout Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
● Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
● White-Rodgers Electric Co., St. Louis, Mo.

VALVES, FIRE PROTECTION, SPRINKLER SYSTEM CONTROL

Barber-Colman Co., Rockford, Ill.
Everlasting Valve Co., Jersey City, N. J.
Fairbanks Co., New York, N. Y.
Hodgman Mfg. Co., Taunton, Mass.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Ohio Injector Co., Wadsworth, O.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwood Sprinkler Co., Worcester, Mass.

VALVES, FLOAT

Albright Equipment Co., Johnstown, Pa.
● Alco Valve Co., St. Louis, Mo.
American Hard Rubber Co., New York, N. Y. (Hard rubber)
Atlas Valve Co., Inc., Newark, N. J.
● Automatic Products Co., Milwaukee, Wis. (Oil)
Bailey Co., Chas. M., San Francisco, Calif.
Beckett & Co., Thomas, Dallas, Tex.
Belfield Co., H., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Caldwell Co., W. E., Louisville, Ky.
Cash Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Clayton Mfg. Co., Alhambra, Calif.
Cleveland Humidifier Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Reading, Pa.
● Detroit Lubricator Co., Detroit, Mich.
Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Frick Co., Waynesboro, Pa.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
● Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Locke Regulator Co., Salem, Mass.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
● Maid-O'-Mist, Inc., Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
● McDonnell & Miller, Inc., Chicago, Ill.
Monash-Younker Co., Chicago, Ill.
Morey, Dan, Los Angeles, Calif.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Perfex Corp., Milwaukee, Wis.
Phillips & Co., H. A., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Ross Valve Mfg. Co., Inc., Troy. N. Y,
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
● Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Skuttle Mfg. Co., Detroit, Mich.
Spence Engineering Co., Inc., Walden, N. Y.
Sterling, Inc., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Swartwout Co., Cleveland, O.
Viking Air Conditioning Corp., Cleveland, O.
Watts Regulator Co., Lawrence, Mass.

VALVES, FLOW CONTROL, FOR HOT WATER HEATING SYSTEMS

Barber-Colman Co., Rockford, Ill.
● Bell & Gossett Co., Morton Grove, Ill.
Hammel-Dahl Co., Providence, R. I.
● Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
● Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Taco Heaters, Inc., New York, N. Y.
● Thrush & Co., H. A., Peru, Ind.
● Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.

VALVES, FORGED STEEL

Albright Equipment Co., Johnstown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
Cochrane Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
● Henry Valve Co., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
O'Malley Valve Co., Edward, Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
R-S Products Corp., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Steel Improvement & Forge Co., Cleveland, O.
Strong, Carlisle & Hammond Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J.

VALVES, GATE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Hasco Valve & Machine Co., Milwaukee, Wis.
● Jenkins Bros., New York, N. Y.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GATE, BRASS AND BRONZE

● American Brass Co., Waterbury, Conn.
Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa.
Capitol Brass Works, Div. of Bohn Aluminum Brass Corp., Detroit, Mich.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., Inc., T. E., New York, N. Y.
Cooper Co., Clark, Palmyra, N. J.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
Fairbanks Co., New York, N. Y.
Hammond Brass Wks., Hammond, Ind.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakffield, Mass. (Tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
● Milwaukee Valve Co., Milwaukee, Wis.
Northern Indiana Brass Co., Elkhart, Ind.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ohio Pattern Wks. & Foundry Co., Cincinnati, O.
Ostlind Valve, Inc., Portland, Ore.
Pittsburgh Valve & Fittings Corp., Barberton, O.

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Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Schaible Co., The Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Pipe Fittings Co., Birmingham, Ala.
● Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Cincinnati, O.

VALVES, GATE, IRON BODY

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
Fairbanks Co., New York, N. Y.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Co., Barberton, O.
Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Scott Valve Mfg. Co., Detroit, Mich.
Semet-Solvay Engineering Corp., New York, N. Y.
● Walworth Co., New York, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Valve Co., D. T., Cincinnati, O.

VALVES, GATE, MALLEABLE IRON

● Crane Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

VALVES, GATE, STEEL

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
● Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Everlasting Valve Co., Jersey City, N. J.
● Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GLOBE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Cooper Alloy Foundry Co., Hillside, N. J.
● Crane Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Hasco Valve & Machine Co., Milwaukee, Wis.
● Henry Valve Co., Chicago, Ill.
● Jenkins Bros., New York, N. Y.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
● Walworth Co., New York, N. Y.

VALVES, GLOBE, BRASS AND BRONZE

● American Brass Co., Waterbury, Conn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Co., H., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bowser, Inc., Fort Wayne, Ind.
California Brass Mfg. Co., Los Angeles, Calif.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
Central Valve Mfg. Co., Chicago, Ill.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Clayton Mfg. Co., Alhambra, Calif.
Cooper Co., Clark, Palmyra, N. J.
● Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Fairbanks Co., New York, N. Y.
● Grinnell Co., Inc., Providence, R. I.
Hammond Brass Wks., Hammond, Ind.
● Henry Valve Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
● Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse, Inc., Watertown, Mass.
● Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ohio Pattern Wks. & Foundry Co., Cincinnati, O.
O'Malley Valve Co., Edward, Chicago, Ill.
Ostlind Valve, Inc., Portland, Ore.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Pipe Fittings Co., Birmingham, Ala.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J. (hydraulic service)
Williams Valve Co., D. T., Cincinnati, O.

VALVES, GLOBE, IRON BODY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Co., H., Philadelphia, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Clayton Mfg. Co., Alhambra, Calif.
● Crane Co., Chicago, Ill.
Cyrus Shank Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
Fairbanks Co., New York, N. Y.
Frick Co., Waynesboro, Pa.
● Grinnell Co., Inc., Providence, R. I.
● Henry Valve Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
● Jenkins Bros., New York, N. Y.
● Kennedy Valve Mfg. Co., Elmira, N. Y.
Klingerit, Inc., New York, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Shank Co., Cyrus, Chicago, Ill.
● Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Cincinnati, O.

VALVES, GLOBE, MALLEABLE IRON

Clayton Mfg. Co., Alhambra, Calif.
● Crane Co., Chicago, Ill.
● Henry Valve Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

VALVES, GLOBE, STEEL

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Co., H., Philadelphia, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Clayton Mfg. Co., Alhambra, Calif.
● Crane Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
● Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Parker Appliance Co., The, Cleveland, O.
Powell Co., Wm., Cincinnati, O.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Strong, Carlisle & Hammond Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
● Walworth Co., New York, N. Y.
● Watson-Stillman Co., Roselle, N. J.

VALVES, LINED

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Goodrich Co., B. F., Akron, O. (Rubber lined)
Darling Valve & Mfg. Co., Williamsport, Pa.
● Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (Rubber)
● McAlear Mfg. Co., Div. of Climax Industries, Inc., Chicago, Ill.
National Lead Co., New York, N. Y. (Lead)

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Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
Schutte & Koerting Co., Philadelphia, Pa. (Lead)
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.

VALVES, MIXING, HOT AND COLD WATER

Bailey Co., Chas. M., San Francisco, Calif.
Clayton Mfg. Co., Alhambra, Calif.
• Dole Valve Co., The, Chicago, Ill.
• Fulton Sylphon Co., Knoxville, Tenn.
• General Fittings Co., Providence, R. I.
Holby Valve Co., New York, N. Y.
Lawler Automatic Controls, Mount Vernon, N. Y.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Rooke Co., Leonard, Providence, R. I.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Thermo-Mix, Inc., Long Island City, N. Y.
Watts Regulator Co., Lawrenceville, Mass.

VALVES, MIXING, STEAM AND WATER

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Central Brass Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
• Fulton Sylphon Co., Knoxville, Tenn.
• General Fittings Co., Providence, R. I.
Hammel-Dahl Co., Providence, R. I.
• Johnson Service Co., Milwaukee, Wis.
Leonard Valve Co., Providence, R. I.
Powers Regulator Co., Chicago, Ill.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Vapor Car Heating Co., Inc., Chicago, Ill.

VALVES, MOTOR OPERATED

• Alco Valve Co., St. Louis, Mo.
Armstrong Heat Control Co., Portland, Ore.
• Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
• Bell & Gossett Co., Morton Grove, Ill.
Bristol Co., Waterbury, Conn.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cochrane Corp., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
• Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Foxboro Co., Foxboro, Mass.
• General Controls Co., Glendale, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Homestead Valve Mfg. Co., Coraopolis, Pa.
• Illinois Engineering Co., Chicago, Ill.
• Jenkins Bros., New York, N. Y.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
• Kieley & Mueller, Inc., North Bergen, N. J.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Mason-Neilan Regulator Co., Boston, Mass.
• Mercoid Corp., Chicago, Ill.
Merco-Nordstrom Valve Co., Pittsburgh, Pa.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
North American Mfg. Co., Cleveland, O.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
• Tallmadge & Co., Webster, East Orange, N. J.
• Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit. Mich.
Vapor Car Heating Co., Inc., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
• Webster & Co., Warren, Camden, N. J.
• Webster Tallmadge & Co., East Orange, N. J.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, NEEDLE

Alloy Steel Products Co, Linden, N. J. (Stainless steel).
• Automatic Products Co., Milwaukee, Wis. (Oil).
Beckett & Co., Thomas, Dallas, Tex.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Clayton Mfg. Co., Alhambra, Calif.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Cyrus Shank Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
• Detroit Lubricator Co., Detroit, Mich.
Edward Valves, Inc., East Chicago, Ind.
Grove Regulator Co., Oakland, Calif.
• Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Jenkins Bros., New York, N. Y.
Lunkenheimer Co., Cincinnati, O.
• Maid-O'-Mist, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridegport, Conn.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• McDonnell & Miller, Inc., Chicago, Ill.
• Milwaukee Valve Co., Milwaukee, Wis.
Norgren Co., C. A., Denver, Colo.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Parker Appliance Co., The, Cleveland, O.
Patrol Valve Co., The, Cleveland, O.
Powell Co., Wm., Cincinnati, O.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Shank Co., Cyrus, Chicago, Ill.
• Taylor Instrument Companies, Rochester, N. Y.
• Walworth Co., New York, N. Y.
• Watson-Stillman Co., Roselle, N. J. (Hydraulic service).
Webster Electric Co., Racine, Wis. (Pressure regulating valve for oil burners).
Williams Valve Co., D. T., Cincinnati, O.

VALVES, PLASTIC

Haveg Corp., Newark, Del.

VALVES, PLUG

Alten's Foundry & Machine Works, Lancaster, O.
American Car & Foundry Co., New York, N. Y.
Andale Co., Philadelphia, Pa.
Barrett, Haentjens & Co., Hazelton, Pa.
Barrett Machine Co., N. S. Pittsburgh, Pa.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cooper Alloy Foundry Co., Hillside, N. J.
• Crane Co., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting).
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Fairbanks Co., New York, N. Y.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Hamer Oil Tool Co., Long Beach, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
• Jenkins Bros., New York, N. Y.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
Kitson Co., Philadelphia, Pa.
Knight, Maurice A., Akron, O., (Stoneware).
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber).
Merco-Nordstrom Valve Co., Pittsburgh, Pa. (Lubricated).
Mueller Co., Decatur, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Ohio Injector Co., Wadsworth, O.
O'Malley Valve Co., Edward, Chicago, Ill.
Ostlind Valve, Inc., Portland, Ore.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Brass Mfg. Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Stockham Pipe Fittings Co., Birmingham, Ala.
• Taylor Instrument Companies, Rochester, N. Y.
• Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Cincinnati, O.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, PRESSURE REDUCING AND REGULATING, AIR AND GAS

Atlas Valve Co., Inc., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Belfield Co., H., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.

Boylston Steam Specialty Co., Chicago, Ill.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
● Clark Mfg. Co., Cleveland, O.
Clayton Mfg. Co., Alhambra, Calif.
Conoflow Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Regulator and Instrument Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Reading, Pa.
Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
● Fulton Sylphon Co., Knoxville, Tenn.
● General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
● Hagan Corp., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
● Henry Valve Co., Chicago, Ill.
Hubbell Corp., Chicago, Ill.
● Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Liquid Carbonic Corp., The, Chicago, Ill.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Northern Equipment Co., Erie, Pa.
● Powers Regulator Co., Chicago, Ill.
Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
Sullivan Valve & Engineering Co., Butte, Mont.
Swartwout Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
● Thrush & Co., H. A., Peru, Ind.
Torchweld Equipment Div., National Cylinder Gas Co., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Watts Regulator Co., Lawrence, Mass.

VALVES, PRESSURE REDUCING AND REGULATING, HOT WATER

Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
● Bell & Gossett Co., Morton Grove, Ill.
Boylston Steam Specialty Co., Chicago, Ill.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Conoflow Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Reading, Pa.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
● Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg. Co., Div. of Climax Industries, Inc., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Powers Regulator Co., Chicago, Ill.
Republic Flow Meters Co., Chicago, Ill.
Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Spence Engineering Co., Inc., Walden, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
● Thrush & Co., H. A., Peru, Ind.
● Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

VALVES, PRESSURE REDUCING AND REGULATING, STEAM

American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Inc., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Belfield Co., H., Philadelphia, Pa.
Bolyston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
● Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
● Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., American Chain & Cable Co., Reading, Pa.
● Dunham Co., C. A., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
● Fulton Sylphon Co., The, Knoxville, Tenn.
● General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
● Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Chicago, Ill.
● Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Kilpfel Mfg. Co., Hamilton, O.
Leslie Co., Lynhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
● McAlear Mfg., Div. of Climax Industries, Inc., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Co., Erie, Pa.
Powers Regulator Co., Chicago, Ill.
Republic Flow Meters Co., Chicago, Ill.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
● Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Spence Eungineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swartwout Co., Cleveland, O.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Vapor Car Heating Co., Inc., Chicago, Ill.
Watts Regulator Co., Lawrence, Mass.

VALVES, PUMP

Anchor Packing Co., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Clayton Mfg. Co., Alhambra, Calif.
Dick Co., Inc., R. & J., Passaic, N. J.
Durabla Mfg. Co., New York, N. Y.
Garlock Packing Co., Palmyra, N. Y.
Goodrich Co., B. F., Akron, O.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
United States Rubber Company, New York, N. Y.
Williams Gauge Co., Pittsburgh, Pa.

VALVES, RADIATOR, AIR

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Anderson Products, Inc., Cambridge, Mass.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Curtis Automotive Devices, Inc., Dayton, O.
● Dole Valve Co., The, Chicago, Ill.
Gorton Heating Co., Cranford, N. J.
● Hoffman Specialty Corp., Indianapolis, Ind.
Keeney Mfg. Co., Newington, Conn.

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Little Mfg. Co., M. S., Hartford, Conn.
• Maid-O'-Mist, Inc., Chicago, Ill. (Humidifying).
Majot Automatic Machine Co., Inc., East Orange, N. J.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
• McAlear Mfg. Co. Div. of Climax Industries, inc., Chicago, Ill.
New York Air Valve Corp., New York, N. Y.
Powers Regulator Co., Chicago, Ill.
Sullivan Valve & Engineering Co., Butte, Mont.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, ELECTRIC

Barber-Colman Co., Rockford, Ill.
• Fulton Sylphon Co., Knoxville, Tenn.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Sarcotherm Controls, Inc., New York, N. Y.
Vapor Car Heating Co., Inc., Chicago, Ill.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, PNEUMATIC

Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
• Johnson Service Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, SELF-CONTAINED

Edison, Inc., Thos. A., Instrument Div., West Orange, N. J.
• Fulton Sylphon Co., Knoxville, Tenn.
Lawler Automatic Controls, Mount Vernon, N. Y.
Majot Automatic Machine Co., Inc., East Orange, N. J.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Sterling, Inc., Milwaukee, Wis.
• Trane Co., The, LaCrosse, Wis.

VALVES, RADIATOR, ORIFICE

American District Steam Co., North Tonawanda, N. Y.
• Autempco Corp., New York, N. Y.
Barnes & Jones, Inc., Boston, Mass.
• Dunham Co., C. A., Chicago, Ill.
• Grinnell Co., Inc., Providence, R. I.
• Haines & Co., William S., Philadelphia, Pa.
• Illinois Engineering Co., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
New York Air Valve Corp., New York, N. Y.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
• Trane Co., The, Lacrosse, Wis.
• Webster & Co., Warren, Camden, N. J.

VALVES, RADIATOR, STEAM AND HOT WATER, HAND

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Belfield Co., H., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
• Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
• Dunham Co., C. A., Chicago, Ill.
Fairbanks Co., New York, N. Y.
• Grinnell Co., Inc., Providence, R. I.
• Haines & Co., William S., Philadelphia, Pa.
Hammond Brass Wks., Hammond, Ind.
• Hoffman Specialty Co., Indianapolis, Ind.
• Illinois Engineering Co., Chicago, Ill.
• Jenkins Bros., New York, N. Y.
• Kennedy Valve Mfg. Co., Elmira, N. Y.
Lunkenheimer Co., Cincinnati, O.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
• McAlear Mfg., Div. of Climax Industries, Inc., Chicago, Ill.
• Milwaukee Valve Co., Milwaukee, Wis.
Northern Indiana Brass Co., Elkhart, Ind.
Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
• Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling, Inc., Milwaukee, Wis.
• Trane Co., The, La Crosse, Wis.
• Walworth Co., New York, N. Y.
• Webster & Co., Warren, Camden, N. J.
Williams Valve Co., D. T., Cincinnati, O.

VALVES, RADIATOR, STEAM AND HOT WATER, MODULATING

American District Steam Co., North Tonawanda, N. Y.
American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Barnes & Jones, Inc., Boston, Mass.
• Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
• Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
• Dunham Co., C. A., Chicago, Ill.
• Fulton Sylphon Co., Knoxville, Tenn.
• Haines & Co., William S., Philadelphia, Pa.
• Hoffman Specialty Co., Indianapolis, Ind.
• Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York, N. Y.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
• McAlear Mfg. Div. of Climax Industries, Inc., Chicago, Ill.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mouat Vapor Heating Co., The, Cleveland, O.
Ohio Brass Co., Mansfield, O.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling, Inc., Milwaukee, Wis.
• Tallmadge & Co., Webster, East Orange, N. J.
• Trane Co., The, LaCrosse, Wis.
Vapor Specialty Co., New York, N. Y.
• Webster & Co., Warren, Camden, N. J.
• Webster Tallmadge & Co., East Orange, N. J.

VALVES, REFRIGERATION (ANGLE, CHECK, GATE, GLOBE, NEEDLE, RELIEF)

• Baker Ice Machine Co., Inc., Omaha, Neb.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Central Brass Mfg. Co., Cleveland, O.
• Crane Co., Chicago, Ill.
Cyrus Shank Co., Chicago, Ill.
Dersch, Geaswein & Neuert, Inc., Chicago, Ill.
Detroit Stamping Co., Detroit, Mich.
Frick Co., Waynesboro, Pa.
• Henry Valve Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
• Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
• Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Peerless of America, Inc., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Shank Co., Cyrus, Chicago, Ill.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Triumph Ice Machine Co., Cincinnati, O.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
• Walworth Co., New York, N. Y.
Weatherhead Co., Cleveland, O.
• Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, BACK PRESSURE

• Alco Valve Co., St. Louis, Mo.
Bailey Co., Chas. M., San Francisco, Calif.
Cash Co., A. W., Decatur, Ill.
Dersch, Geaswein & Neuert, Inc., Chicago, Ill.
Electrimatic, Chicago, Ill.
• Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
• Henry Valve Co., Chicago, Ill.
Hubbell Corp., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
• Mueller Brass Co., Port Huron, Mich.
Temprite Products Corp., Detroit, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, EXPANSION, CONSTANT PRESSURE

• Alco Valve Co., St. Louis, Mo.
• Automatic Products Co., Milwaukee, Wis.
• Baker Ice Machine Co., Inc., Omaha, Neb.

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Cash Co., A. W., Decatur, Ill.
● Detroit Lubricator Co., Detroit, Mich.
Foster Engineering Co., Newark, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
Hubbell Corp., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mayson Mfg. Co., Inc., Detroit, Mich.
● Peerless of America, Inc., Chicago, Ill.
Tenney Engineering, Inc., Newark, N. J.
Vilter Mfg. Co., Milwaukee, Wis.
X L Refrigerating Co., Chicago, Ill.

VALVES, REFRIGERATION, EXPANSION THERMOSTATIC

● Alco Valve Co., St. Louis, Mo.
Amp. Corp., St. Louis, Mo.
● Automatic Products Co., Milwaukee, Wis.
● Detroit Lubricator Co., Detroit, Mich.
Frigidaire Div., General Motors Corp., Dayton, O.
● General Controls Co., Glendale, Calif.
Mayson Mfg. Co., Inc., Detroit, Mich.
Peerless of America, Inc., Chicago, Ill.
● Sporlan Valve Co., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
X L Refrigerating Co., Chicago, Ill.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE

● Alco Valve Co., St. Louis, Mo.
American Injector Co., Detroit, Mich.
Foster Engineering Co., Newark, N. J.
Frick Co., Waynesboro, Pa.
Hubbell Corp., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Magnetrol, Inc., Chicago, Ill.
● Mercoid Corp., Chicago, Ill.
Phillips & Co., H. A., Chicago, Ill.
Temprite Products Corp., Detroit, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Voss Co., J. H. H., New York, N. Y.
Weatherhead Co., Cleveland, O.
● Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE AND LOW PRESSURE

Temprite Products Corp., Detroit, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Voss Co., J. H. H., New York, N. Y.

VALVES, REFRIGERATION, LIQUID CONTROL, FLOAT PILOTED

● Alco Valve Co., St. Louis, Mo.
Clayton Mfg. Co., Alhambra, Calif.
Phillips & Co., H. A., Chicago, Ill.

VALVES REFRIGERATION, MAGNETIC STOP

● Alco Valve Co., St. Louis, Mo.
● Automatic Products Co., Milwaukee, Wis.
Automatic Switch Co., New York, N. Y.
● Detroit Lubricator Co., Detroit, Mich.
Electrimatic, Chicago, Ill.
Farris Engineering Co., Palisades Park, N. J.
Frick Co., Waynesboro, Pa.
● General Controls Co., Glendale, Calif.
● Henry Valve Co., Chicago, Ill.
Hubbell Corp., Chicago, Ill.
● Mercoid Corp., Chicago, Ill.
● Penn Electric Switch Co., Goshen, Ind.

VALVES, REFRIGERATION, WATER REGULATING, PRESSURE OR TEMPERATURE ACTUATED

American Injector Co., Detroit, Mich.
Amp Corp., St. Louis, Mo.
Art Valve Co., Chicago, Ill.
● Automatic Products Co., Milwaukee, Wis.
Bailey Co., Chas. M., San Francisco, Calif.
Cash Co., A. W., Decatur, Ill.
Cyrus Shank Co., Chicago, Ill.
Electrimatic, Chicago, Ill.
● Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
● Henry Valve Co., Chicago, Ill.
Hubbell Corp., Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
● Mercoid Corp., Chicago, Ill.
Mueller Co., Decatur, Ill.
● Penn Electric Switch Co., Goshen, Ind.
Perfection Refrigeration Parts Co., Harvey, Ill.
● Sarco Co., Inc., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
Spence Engineering Co., Inc., Walden, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.

VALVES, RELIEF, HOT WATER, COMBINED PRESSURE AND TEMPERATURE OPERATED

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
● Crane Co., Chicago, Ill.
Farris Engineering Co., Palisades Park, N. J.
● Fisher Governor Co., Marshalltown, Ia.
Kainer & Co., Chicago, Ill.
Kitson & Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Patrol Valve Co., The, Cleveland, O.
Spencer Thermostat Co., Attleboro, Mass.
● Thrush & Co., H. A., Peru, Ind.
● Trane Co., The, La Crosse, Wis.
Watts Regulator Co., Lawrence, Mass.

VALVES, RELIEF, HOT WATER, PRESSURE OPERATED

Ashton Valve Co., Cambridge, Mass.
Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
● Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Boylston Steam Specialty Co., Chicago, Ill.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
● Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Durabla Mfg. Co., New York, N. Y.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Co., Palisades Park, N. J.
● Fisher Governor Co., Marshalltown, Ia.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
● Kieley & Muller, Inc., North Bergen, N. J.
Kitson Co., Philadelphia, Pa.
Klipfel Mfg. Co., Chicago, Ill.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., Chicago, Ill.
● McAlear Mfg. Co., Div. of Climax Industries, Inc., Chicago, Ill.
● McDonnell & Miller, Inc., Chicago, Ill.
● Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Neptune Meter Co., New York, N. Y.
Parker Appliance Co., The, Cleveland, O.
Patrol Valve Co., The, Cleveland, O.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Spencer Thermostat Co., Attleboro, Mass.
Staples & Pfeiffer, San Francisco, Calif.
Sullivan Valve & Engineering Co., Butte, Mont.
Swartwout Co., Cleveland, O.
Taco Heaters, Inc., New York, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
● Thrush & Co., H. A., Peru, Ind.
● Trane Co., The, LaCrosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

VALVES, RELIEF HOT WATER, PRESSURE OPERATED, SELF-FILLING

Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
● Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
● Crane Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
● Kieley & Mueller, Inc., North Bergen, N. J.
Mueller Co., Decatur, Ill.
● Thrush & Co., H. A., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

VALVES, RELIEF, OIL

Andale Co., Philadelphia, Pa.
Ashton Valve Co., Cambridge, Mass.

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

Bailey Co., Chas. M., San Francisco, Calif.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clayton Mfg. Co., Alhambra, Calif.
• Crane Co., Chicago, Ill.
Durabla Mfg. Co., New York, N. Y.
Farris Engineering Co., Palisades Park, N. J.
• Fisher Governor Co., Marshalltown, Ia.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Hammel-Dahl Co., Providence, R. I.
Keckley Co., O. C., Chicago, Ill.
Kunkle Valve Co., Ft. Wayne, Ind.
Locke Regulator Co., Salem, Mass.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
• Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Parker Appliance Co., The, Cleveland, O.
Scott Valve Mfg. Co., Detroit, Mich.

VALVES, SADDLE

Darling Valve & Mfg. Co., Williamsport, Pa.
Fairbanks Co., New York, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
• Maid-O'-Mist, Inc., Chicago, Ill.
Ohio Injector Co., Wadsworth, O.
• Walworth Co., New York, N. Y.

VALVES, SAFETY, STEAM

Ashton Valve Co., Cambridge, Mass.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., Detroit, Mich.
• Crane Co., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Co., Palisades Park, N. J.
Foster Engineering Co., Newark, N. J.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
• Walworth Co., New York, N. Y.

VALVES, SOLDER JOINT

• American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., Cleveland, O.
• Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Fairbanks Co., New York, N. Y. (Silver braze joints)
Hammond Brass Works, Hammond, Ind.
Imperial Brass Mfg. Co., Chicago, Ill.
• Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
• Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
• Walworth Co., New York, N. Y. (Brazed)
Weatherhead Co., Cleveland, O.

VALVES, SOLENOID

Albright Equipment Co., Johnstown, Pa.
• Alco Valve Co., St. Louis, Mo.
Allied Control Co., Inc., New York, N. Y.
• Automatic Products Co., Milwaukee, Wis.
Automatic Switch Co., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Belfield Co., H., Philadelphia, Pa.
Blackburn-Smith Mfg. Co., Hoboken, N. J.
Clayton Mfg. Co., Alhambra, Calif.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
• Detroit Lubricator Co., Detroit, Mich.
Electric Valve Mfg. Co., Inc., New York, N. Y.
Electrimatic, Chicago, Ill.
Erickson Specialty Co., Cohoes, N. Y.
Frick Co., Waynesboro, Pa.
• General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
• Henry Valve Co., Chicago, Ill.
Hubbell Corp., Chicago, Ill.
Hunt & Son, C. B., Salem, O.
• Johnson Corp., Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Lammert & Mann Co., Chicago, Ill. (Gas safety shut-off)
Lonergan Co., J. E., Philadelphia, Pa.
• McDonnell & Miller, Inc., Chicago, Ill.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Parker Appliance Co., The, Cleveland, O.
Payne Furnace Co., Beverly Hills, Calif.
• Penn Electric Switch Co., Goshen, Ind.
Pfening Co., Fred D., Columbus, O. (1" water and steam)
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
• Sarco Co., Inc., New York, N. Y.
Sarcotherm Controls, Inc., New York, N. Y.
Sciaky Bros., Inc., Chicago, Ill.
• Sporlan Valve Co., St. Louis, Mo.
Square D Co., Detroit, Mich.
Sterling, Inc., Milwaukee, Wis.
Supreme Electric Products Corp., Rochester, N. Y.
Locke Regulator Co., Salem, Mass.
Vapor Car Heating Co., Inc., Chicago, Ill.
• White-Rodgers Electric Co., St. Louis, Mo.

VALVES, 2, 3, AND 4 WAY

Albright Equipment Co., Johnstown, Pa.
• Alco Valve Co., St. Louis, Mo.
Allied Control Co., Inc., New York, N. Y.
• American Brass Co., Waterbury, Conn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Belfield Co., H., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bordo Co., Inc., Glenside, Pa.
Bristol Co., Waterbury, Conn.
Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clayton Mfg. Co., Alhambra, Calif.
• Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
• Detroit Lubricator Co., Detroit, Mich.
Farris Engineering Co., Palisades Park, N. J.
• Fisher Governor Co., Marshalltown, Ia.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
• General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
• Henry Valve Co., Chicago, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hunt & Son, C. B., Salem, O.
Hydro-Aire, Los Angeles, Calif.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
• Johnson Service Co., Milwaukee, Wis.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
• McAlear Mfg., Div. of Climax Industries, Inc., Chicago, Ill.
• Mercoid Corp., Chicago, Ill.
Merco-Nordstrom Valve Co., Pittsburgh, Pa.
• Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
• Nicholson & Co., W. H., Wilkes-Barre, Pa.
Parker Appliance Co., The, Cleveland, O.
• Penn Electric Switch Co., Goshen, Ind.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Salem, Mass.
Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spence Engineering Co., Inc., Walden, N. Y.
• Taylor Instrument Companies, Rochester, N. Y.
• Walworth Co., New York, N. Y. (Lubricated plug valves)
• Watson-Stillman Co., Roselle, N. J. (Hydraulic service)
Weatherhead Co., Cleveland, O.
Williams Valve Co., D. T., Cincinnati, O.

VANES, DUCT TURNING, PREFABRICATED

• Air Devices, Inc., New York, N. Y.
• Anemostat Corp. of America, New York, N. Y. (Equalizing deflectors)
Barber-Colman Co., Rockford, Ill.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
• Tuttle & Bailey, Inc., New Britain, Conn.
• Waterloo Register Sales Co., Waterloo, Ia.

VAPOR HEATING SYSTEMS

See Systems, Heating, Vapor

VARIABLE SPEED DRIVES

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

VARIABLE SPEED PULLEYS

See Changers, Speed, Mechanical

V-BELT DRIVES

See Drives, V-Belt

VELOCITY REGULATORS

See Regulators, Air Velocity

VENTILATING HOSE

See Ducts and Duct Fittings, Prefabricated, Non-Metallic

VENTILATION HEATERS

See Surface, Finned, Heating

VENTILATORS, MUSHROOM

Aeolus Dickinson, Chicago, Ill.
Best Register Co., Milwaukee, Wis.
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dickinson, Aeolus, Chicago, Ill.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Knowles Mushroom Ventilator Co., Upper Monclair, N. J.
Lumm Co., A. H., Toledo, O.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Penn Ventilating Co., Philadelphia, Pa.
Peters-Dalton, Inc., Detroit, Mich.
Van Noorden Co., E., Boston, Mass.
Ventilating Products Co., Chicago, Ill.

VENTILATORS, ROOF, FAN

Aeolus Dickinson, Chicago, Ill.
Aerovent Fan Co., Piqua, O.
Air Conditioning Products Co., Detroit, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Airmaster Corp., Chicago, Ill.
Allen Corp., Detroit, Mich.
● American Blower Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
American-Larson Ventilating Co., Pittsburgh, Pa.
American Steel Band Co., Pittsburgh, Pa.
Arex Co., Chicago, Ill.
Belanger Fan & Blower Co., Detroit, Mich.
● Bishop & Babcock Co., Cleveland, O.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
● Chelsea Products, Inc., Irvington, N. J.
Clay Equipment Corp., Cedar Falls, Ia.
Davidson Hy Duty Roof Fan Co., Newton, Mass.
De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Diehl Mfg. Co., Somerville, N. J.
Dual Air Fan Co., Chicago, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Fingles Co., The, Baltimore, Md.
Gallaher Co., The, Owatonna, Minn.
Gehri Co., Tacoma, Wash.
Hartzell Propeller Fan Co., Piqua, O.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
● Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Johnson Fan & Blower Corp., Chicago, Ill.
Jordan & Co., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Klee Co., Geo. B., Cincinnati, O.
Lee & Son Co., Thomas, Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Martin Fan & Blower Co., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
Myers Electric Co., Inc., Pittsburgh, Pa.
Nationalaire Corp., Detroit, Mich.
Nelson Corp., Herman, Moline, Ill.
New York Blower Co., Chicago, Ill.
Newcomb Engineering Co., Grand Rapids, Mich.
Peerless Electric Co., Warren, O.
Penn Ventilating Co., Philadelphia, Pa.
Peters-Dalton, Inc., Detroit, Mich.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
Power Engineering Co., Chicago, Ill.
Powermatic Ventilator Co., Cleveland, O.
Propellair, Inc., Springfield, O.
Reed Unit-Fans, Inc., New Orleans, La.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
Schwitzer-Cummins Co., Indianapolis, Ind.
Shreveport Engineering Co., Inc., Shreveport, La.
Somers, Inc., H. J., Detroit, Mich.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Swartwout Co., Cleveland, O.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
● Trane Co., The, LaCrosse, Wis.
Truflo Fan Co., Harmony, Pa.
Uno Ventilator Co., Cliftondale, Mass.
Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Viking Air Conditioning Corp., Cleveland, O.
Washburne & Co., E. G., New York, N. Y.
Waverly Heating Supply Co., Boston, Mass.
Western Engineering & Mfg. Co., Los Angeles, Calif.
Wind-Way Fan & Ventilator Co., New Orleans, La.
● Wing Mfg. Co., L. J., New York, N. Y.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
● Young Radiator Co., Racine, Wis.

VENTILATORS, ROOF, GRAVITY

A-J Mfg. Co., Kansas City, Mo.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metail & Roofing Co., Cincinnati, O.
Accurate Mfg. Works, Chicago, Ill.
Aeolus Dickinson, Chicago, Ill.
Air Control Products, Inc., Coopersville, Mich.
● Air Devices, Inc., New York, N. Y.
Allen Corp., Detroit, Mich.
American-Larson Ventilating Co., Pittsburgh, Pa.
American Metal Products Co., Fort Worth, Tex.
American Sheet Metal Works, New Orleans, La.
American Steel Band Co., Pittsburgh, Pa.
Arex Co., Chicago, Ill.
Autoforce Ventilating System, Boston, Mass.
Berger Bros. Co., Philadelphia, Pa.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Clay Equipment Corp., Cedar Falls, Ia.
Danzer Metal Works Co., Hagerstown, Md.
Day Co., The, Minneapolis, Minn.
Dickinson, Aeolus, Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Fingles Co., The, Baltimore, Md.
Gehri Co., Tacoma, Wash.
● Gelert Co., C. R., Pasadena, Calif.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
International Steel Co., Evansville, Ind.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Iwan Brothers, South Bend, Ind.
Jamar Co., Walker, Duluth, Minn.
Jordan & Co., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Klauer Mfg. Co., Dubuque, Ia.
Kleenaire Corp., Stevens Point, Wis.
La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
Lee & Son Co., Thomas, Cincinnati, O.
Leslie Welding Co., Chicago, Ill.
Levow, David, New York, N. Y.
Lumm Co., A. H., Toledo, O.
Lyon, Conklin & Co., Inc., Baltimore, Md.
Mellish & Murray Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Wis.
Moeschl-Edwards Corrugating Co., Inc., The, Cincinnati, O.
Nationalaire Corp., Detroit, Mich.
National Metal Fabricators, Chicago, Ill.
Newcomb Engineering Co., Grand Rapids, Mich.
Patten Co., J. V., Sycamore, Ill.
Penn Ventilating Co., Philadelphia, Pa.
Peters-Dalton, Inc., Detroit, Mich.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
Pioneer Roofing & Sheet Metal Co., Muskogee, Okla.
Protected Steel Products Co., Washington, Pa.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
Ryniker Steel Products Co., Billings, Mont.
St. Paul Corrugating Co., St. Paul, Minn.
Sheet Metal Mfg. Co., Inc., Brooklyn, N. Y.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
Souther Iron Co., E. E., St. Louis, Mo.
Southern States Iron Roofing Co., Savannah, Ga.
Standard Furnace & Supply Co., Omaha, Neb.
Standard Ventilator Co., Lewisburg, Pa.
Steinhorst & Sons, Inc., Emil, Utica, N. Y.
Swartwout Co., Cleveland, O.
Tierney Rotor Ventilator Co., Minneapolis, Minn.
Tiffin Eaves Trough Co., Tiffin, O.
Uno Ventilator Co., Cliftondale, Mass.
Van Noorden Co., E., Boston, Mass.
Walker Jamar Co., Duluth, Minn.
Western Engineering & Mfg. Co., Los Angeles, Calif.
Willis Steel Corp., Galesburg, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
York Corrugating Co., York, Pa.

VENTILATORS, UNIT

Circulators & Devices Mfg. Corp., New York, N. Y.
Johnson Fan & Blower Corp., Chicago, Ill.

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Nelson Corp., Herman, Moline, Ill.
● Nesbitt, Inc., John J., Philadelphia, Pa.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Trane Co., The, La Crosse, Wis.

VIBRATION ABSORBERS

See Absorbers, Vibration

VIBRATION ELIMINATORS

See Absorbers, Vibration; Bases and Pads, Vibration Isolating; Hose, Metal and Fittings

VIBRATION ISOLATORS

See Absorbers, Vibration; Bases and Pads, Vibration Isolating; Hose, Metal and Fittings

VISCOSIMETERS

American Instrument Co., Silver Spring, Md.
Brabender Corp., Rochelle Park, N. J.
Brookfield Engineering Laboratories, Sharon, Mass.
Daigger & Co., A., Chicago, Ill.
Fish-Schurman Corp., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Giannini Co., Inc., G. M., Pasadena, Calif.
Greiner Co., Emil, New York, N. Y.
Humboldt Mfg. Co., Chicago, Ill.
Olsen Testing Machine Co., Tinius, Philadelphia, Pa.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Precision Scientific Co., Chicago, Ill.
Ruehfel Co., Inc., George, Brooklyn, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Div., C. J., Portable Products Corp., Brooklyn, N. Y.
Thomas Co., Arthur H., Philadelphia, Pa.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Will Corp., Rochester, N. Y.

VISCOUS LIQUID PUMPS

See Pumps, Viscous Liquids

VISES, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., Warren, O. (Sawing—for tubing)
Billings & Spencer Co., Hartford, Conn.
Crown Die & Tool Co., Chicago, Ill.
Desmond-Stephens Mfg. Co., Urbana, O.
Erie Tool Wks., Erie, Pa.
Hollands Mfg. Co., Erie, Pa.
International Nutyp Tool Co., Oswego, N. Y.
Jarecki Mfg. Co., Erie, Pa.
Munton Mfg. Co., Franklin Park, Ill.
Nye Tool & Machine Co., Chicago, Ill.
● Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Trimont Mfg. Co., Roxbury, Mass.
Vanderman Mfg. Co., Willimantic, Conn.
Williams & Co., J. H., Buffalo, N. Y.
Yost Mfg. Co., Meadville, Pa.

VISE STANDS

See Stands, Pipe Vise

WALL THERMOSTATS

See Thermostats, Room or Wall

WARM AIR FURNACES

See Furnaces, Warm Air

WASHERS, AIR

● Air & Refrigeration Corp., New York, N. Y.
Airwasher Corp., Lansing, Mich.
Alton Mfg. Co., Dallas, Tex.
● American Blower Corp., Detroit, Mich.
Bahnson Co., Winston-Salem, N. C.
Ballantyne Co., Omaha, Neb.
Bayley Blower Co., Milwaukee, Wis.
● Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
● Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Centri-Spray Corp., Detroit, Mich. (Wet type)
● Clarage Fan Co., Kalamazoo, Mich.
Columbus Heating & Ventilating Co., Columbus, O.
Comfort Products Corp., Dallas, Tex.
Doyle & Roth Mfg. Co., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Ice-Air Conditioning Co., Inc., Brooklyn, N. Y.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
● Murray Mfg. Co., D. J., Wausau, Wis.
New York Blower Co., Chicago, Ill.
Northern Blower Co., Cleveland, O.
Parks-Cramer Co., Fitchburg, Mass.
Peters-Dalton, Inc., Detroit, Mich.
Phillips Cooling Tower Co., Inc., New York, N. Y.
Ross Sprinkler Co., Pasadena, Calif.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Strandwitz & Co., Inc., W. J., Camden, N. J.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
● Trane Co., The, La Crosse, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
York Corp., York, Pa.

WATER CHILLERS

See Chillers, Water, for Air Conditioning and Refrigeration

WATER DISTRIBUTORS FOR CONDENSERS

See Distributors, Water, for Condensers

WATER FILTERS

See Filters, Water

WATER HEATERS

See Heaters, Indirect, Submerged; Heaters, Water

WATER METERS

See Meters, Water

WATER SOFTENERS

See Softeners, Water

WATER TREATMENT

See Treatment, Water, to Inhibit Corrosion

WATER VAPOR REFRIGERATION

See Compressors, Refrigerating, Centrifugal; and Compressors, Refrigerating, Steam Jet

WELD TESTING MACHINES

See Machines, Testing, Weld

WELDERS, ARC

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
● Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Borm Mfg. Co., Elgin, Ill.
Commonwealth Electric Welder Mfg. Co., Philadelphia, Pa.
Eisler Engineering Corp., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Ergolyte Mfg. Co., Philadelphia, Pa.
Fern, Ralph, Scranton, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hammett Electric Mfg. Co., Kansas City, Mo.
Hampton Electric Mfg. Co., Pittsburgh, Pa.
Harnischfeger Corp., Milwaukee, Wis.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Hobart Bros. Co., Troy, O.
Hollup Corp., Div. of National Cylinder Gas Co., Chicago, Ill.
Ideal Electric & Mfg. Co., Mansfield, O.
Lee Co., K. O., Aberdeen, S. D.
Lincoln Electric Co., Cleveland, O.
Marquette Mfg. Co., Minneapolis, Minn.
Mid-States Equipment Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
Sight Feed Generator Co., Richmond, Ind.
Smith Corp., A. O., Milwaukee, Wis.
Smith Welding Equipment Corp., Minneapolis, Minn.
Trindl Products, Ltd., Chicago, Ill.
Tweco Products Co., Wichita, Kan. (Cable connectors, electrode holders and accessories)
Una Welding, Inc., Cleveland, O. (Automatic shielded arc welding)
Universal Power Corp., Cleveland, O.
Welding Apparatus Co., Chicago, Ill.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Will-Weld Mfg. Co., Inc., Omaha, Neb.
Wilson Welder & Metals Co., Inc., New York, N. Y.

WELDERS, SPOT

Acme Electric Welder Co., Los Angeles, Calif.
Agnew Electric Co., Milford, Mich.
Alphil Spot Welding Co., Brooklyn, N. Y.
Eisler Engineering Corp., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Federal Machine & Welder Co., Warren, O.
Fern, Ralph, Scranton, Pa.
Micro Products Co., Chicago, Ill.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Precision Welder & Machine Co., Cincinnati, O.
Rex Welder & Engineering Co., Kansas City, Mo.
Sciaky Bros., Inc., Chicago, Ill.
Taylor-Hall Welding Corp., Warren, O.
Taylor-Winfield Corp., Warren, O.
Thomson Electric Welder Co., Lynn, Mass.
Universal Power Corp., Cleveland, O.
Universal Welder Corp., Cleveland, O.

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Weldex, Inc., Detroit, Mich.
Westinghouse Electric Corp., East Pittsburgh, Pa.

WELDERS, STUD

Hollup Corp., Div. of National Cylinder Gas Co., Chicago, Ill.
Nelson Specialty Welding Equipment Corp., San Leandro, Calif.

WELDING COMPOUNDS

See Compounds, Welding

WELDING AND CUTTING APPARATUS, OXY-ACETYLENE

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Atlas Welding Accessories Co., Detroit, Mich. (Weld cleaning tools)
Black Mfg. Co., The, Baltimore, Md.
Dockson Corp., Detroit, Mich.
Ergolyte Mfg. Co., Philadelphia, Pa.
Galv-Weld Products, Dayton, O. (Regalvanizing process)
Harris Calorific Co., The, Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Co., Brooklyn, N. Y.
Ransome Machinery Co., Sub. of Worthington Pump & Machinery Corp., Dunellen, N. J. (Welding positioner)
Sight Feed Generator Co., Richmond, Ind.
Smith Welding Equipment Corp., Minneapolis, Minn.
Torchweld Equipment Div., National Cylinder Gas Co., Chicago, Ill.
Tru-Line Corp., Santa Monica, Calif. (Protractor for marking pipe)
Universal Power Corp., Cleveland, O.
Victor Equipment Co., San Francisco, Calif.
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.

WELDING FUME COLLECTORS

See Exhausters, Welding Fume

WELDING PIPE CLAMPS

See Clamps, Pipe, Welding

WELDING RINGS

See Rings, Welding

WELDING ROD

See Rod, Gas Welding

WHEELS, BLOWER

Advance Aluminum Castings Corp., Chicago, Ill.
Air Controls, Inc., Div. of Cleveland Heater, Co., Cleveland, O.
Bayley Blower Co., Milwaukee, Wis.
Beckett & Co., Thomas, Dallas, Tex.
● Bishop & Babcock Mfg. Co., Cleveland, O.
Brundage Co., The, Kalamazoo, Mich.
● Burden Co., Los Angeles, Calif.
Champion Blower & Forge Co., Lancaster, Pa.
● Clarage Fan Co., Kalamazoo, Mich.
Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Hastings Air Conditioning Co., Hastings, Neb.
Jaden Mfg. Co., Hastings, Neb.
Janette Mfg. Co., Chicago, Ill.
● Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
Mayne Products Co., Dayton, O.
Morrison Products, Inc., Cleveland, O.
New York Blower Co., Chicago, Ill.
Peerless Electric Co., Warren, O.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Torrington Mfg. Co., Torrington, Conn.
● Trane Co., The, La Crosse, Wis.
Triangle Mfg. Co., Oshkosh, Wis.
● United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.

WHITE PRINT MACHINES

See Machines, Blue Print and White Print

WINDOW VENTILATOR AND FILTER UNITS

See Units, Window Ventilator and Filter

WINDOWS, HEAT INSULATING

Advance Insulating Co., Pittsburgh, Pa.
Andersen Corp., Bayport, Minn.
Chamberlin Co. of America, Detroit, Mich.
Detroit Steel Products Co., Detroit, Mich.
Kane Mfg. Corp., Kane, Pa.
Libbey-Owens-Ford Glass Co., Toledo, O.
Mississippi Glass Co., New York, N. Y.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
● Russell Co., F. C., The, Cleveland, O.
Truscon Steel Co., Youngstown, O.

WOOD PIPE

See Pipe, Wood

WRENCHES, ADJUSTABLE

Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Crescent Tool Co., Jamestown, N. Y.
Erie Tool Works, Erie, Pa.
Peck, Stow & Wilcox Co., Southington, Conn.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Boston, Mass.
Williams & Co., J. H., Buffalo, N. Y.

WRENCHES, OPEN END

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Tubing Appliance Co., Los Angeles, Calif.
Williams & Co., J. H., Buffalo, N. Y.

WRENCHES, PIPE

Armstrong Bros. Tool Co., Chicago, Ill.
Bernz Co., Inc., Otto, Rochester, N. Y.
Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Erie Tool Works, Erie, Pa.
International Nutyp Tool Co., Oswego, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
● Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Boston, Mass.
USHCO Mfg. Co., Inc., Buffalo, N. Y.
● Walworth Co., New York, N. Y.

WRENCHES, RATCHET

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Greene, Tweed & Co., New York, N. Y.
Lowell Wrench Co., Worcester, Mass.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Williams & Co., J. H., Buffalo, N. Y.

WRENCHES, SOCKET

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Chicago Pneumatic Tool Co., New York, N. Y. (pneumatic)
Lowell Wrench Co., Worcester, Mass.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Tubing Appliance Co., Los Angeles, Calif.
Williams & Co., J. H., Buffalo, N. Y.

WRENCHES, TORQUE INDICATING

Armstrong Bros. Tool Co., Chicago, Ill.
Automotive Maintenance Machinery Co., North Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
J. O. Mfg. Co., South Gate, Calif.
Richmont, Inc., Los Angeles, Calif.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-On Tools Corp., Kenosha, Wis.
Sturtevant Co., P. A., Addison, Ill.
Williams & Co., J. H., Buffalo, N. Y.

WROUGHT IRON PIPE

See Pipe, Wrought Iron

WROUGHT IRON SHEETS

See Sheets, Wrought Iron

X-RAY MACHINES AND FILM

See Machines and Film, X-Ray

ZINC SHEETS

See Sheets, Zinc

ZONE CONTROLS

See Systems, Heating, Zone Control

● Advertisement in this issue. See Index to Advertisers, pages 343-344.

DIRECTORY SECTION

HEATING, PIPING AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 2 — TRADE NAMES

A-B—Motor controllers. Allen-Bradley Co., Milwaukee, Wis.

A-C—Water treatment. Elgin Softener Corp., Elgin, Ill.

ABC—Humidifiers, dust collectors, unit coolers. American Blower Corp., Detroit, Mich.

ACB—Coatings. Tropical Paint & Oil Co., Cleveland, O.

AGP—Heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

A-P—Damper operators, regulators, thermostats, valves. Automatic Products Co., Milwaukee, Wis.

A.P.S. Plasteel—Metal sheets. Protected Steel Products Co., Washington, Pa.

A.R.A.—Non-metallic sheets and board. Wilson, Inc., Grant, Chicago, Ill.

ARRC—Couplings, fittings, flanges, unions. Union Metal Wks., Chelsea, Mass.

ASBO—Ventilators. American Steel Band Co., Pittsburgh, Pa.

A & T Colloid—Boiler cleaning compounds. Agnew & Tomlinson, New York, N. Y.

Abrasoweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Acco-Lastic—Caulking compounds. Accurate Metal Weather Strip Co., Inc., New York, N. Y.

Accopac—Gaskets, Armstrong Cork Co., Lancaster, Pa.

Ace—Dampers. Martens & Stormoen, Boston, Mass.

Ace—Fittings, pipe, pumps, tanks, valves. American Hard Rubber Co., New York, N. Y.

Ace—Welders. Pier Equipment Mfg. Co., Benton Harbor, Mich.

Ace-Saran—Pipe, tubing. American Hard Rubber Co., New York, N. Y.

Acidseal—Protective coatings. Goodrich Co., B. F., Akron, O.

Acotite—Enamels and lacquers. Acorn Refining Co., Cleveland, O.

Acousteel—Insulation. Celotex Corp., The, Chicago, Ill.

Acousti-Celotex—Insulation. Celotex Corp., The, Chicago, Ill.

Acoustilite—Insulation. Insulite Co., Minneapolis, Minn.

Acoustone—Insulation. United States Gypsum Co., Chicago, Ill.

Acratherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Adamant—Fire brick cement. Botfield Refractories Co., Philadelphia, Pa.

Adastic—Insulating cement. Botfield Refractories Co., Philadelphia, Pa.

Adjustiblade—Registers. Tuttle & Bailey, Inc., New Britain, Conn.

Adjust-O-Feeder—Feeders, pumps, steam system and water treatment. % Proportioneers, Inc. %, Providence, R. I.

Adjustor—Heating systems. The Kehm Corp., Chicago, Ill.

Adsco—Coils, coolers, exchangers, heaters, joints, meters, pipe, pipe hangers and supports, pipe protectors, separators, sight glasses, strainers, regulators, valves. American District Steam Co., North Tonawanda, N. Y.

Adsco-Bannon—Conduit. American District Steam Co., North Tonawanda, N. Y.

Adsco Rotary—Condensation meters. American District Steam Co., North Tonawanda, N. Y.

Adsco Vertical—Traps. American District Steam Co., North Tonawanda, N. Y.

Aemco—Relays, switches. Automatic Electric Mfg. Co., Mankato, Minn.

Aeracool—Blades, fans, louvers and shutters, ventilators. Myers Electric Co., Inc., Pittsburgh, Pa.

Aerate—Ventilators. Aeolus Dickinson, Chicago, Ill.

Aerisweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Aero—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero—Radiation. National Radiator Co., The, Johnstown, Pa.

Aerodyne—Fans. Jeffrey Mfg. Co., Columbus, O.

Aerofuse—Air diffusers. Tuttle & Bailey, Inc., New Britain, Conn.

Aeroplane—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aeroplex—Fans. Bayley Blower Co., Milwaukee, Wis.

Aeropull—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero Seal—Packing. Chicago Belting Co., Chicago, Ill.

Aerospot—Fans. South Bend Air Products, Inc., South Bend, Ind.

Aerotec—Cleaners, collectors, switches. Thermix Engineering Co., Greenwich, Conn.

Afco—Fans, furnaces, heaters. American Furnace Co., St. Louis, Mo.

Affco—Louvers and shutters. American Foundry & Furnace Co., Bloomington, Ill.

Agastat—Time switches, electrical relays. American Gas Accumulator Co., Elizabeth, N. J.

Agile—Welding electrodes. American Agile Corp., Cleveland, O.

Agitair—Air diffusers, grilles, heaters, vanes, ventilators. Air Devices, Inc., New York, N. Y.

Air Control—Fans, heaters, unit air conditioners. Hastings Air Conditioning Co., Hastings, Neb.

Air Flow—Fans. Goettl Bros. Metal Prod. Co., Phoenix, Ariz.

Air Lock—Burners. Reinhard Brothers Co., Minneapolis, Minn.

Air Stone—Conduit. Dockstader, S. E., Washington, D. C.

Air-Van—Ventilators. The Gallaher Co., Owatonna, Minn.

Air Vane—Grilles, registers. Rock Island Register Co., Rock Island, Ill.

Airacoustic—Insulation. Johns-Manville, New York, N. Y.

Air-Champ—Air conditioning units, air washers. Alton Mfg. Co., Dallas, Tex.

Airco—Welding rod, solder, pipe cutting machines. Air Reduction Sales Co., New York, N. Y.

Aircor—Filters. Air Filter Corp., Milwaukee, Wis.

Air-Con—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Airdfin—Heat exchangers. J. F. Pritchard & Co., Kansas City, Mo.

Airefiner—Water treatment. Oakite Products, Inc., New York, N. Y.

Airex—Air washers, fans, unit air conditioners, ventilators. Mountain States Equipment Co., Denver, Colo.

Air-Fan—Window ventilator units. Reliable Sheet Metal Engineering Co., Chicago, Ill.

Air-Flo—Dampers, louvers and shutters. Belanger Fan & Blower Co., Detroit, Mich.

Air-flo—Dampers, louvers and shutters. Air Conditioning Products Co., Detroit, Mich.

Air-flo—Ventilators. Aeolus Dickinson, Chicago, Ill.

Airfoil—Fans, fan blades, ventilators. Aerovent Fan Co., Piqua, O.

Airguide—Hygrometers, thermometers. Fee and Stemwedel, Inc., Chicago, Ill.

Airheater—Unit heaters. Airtherm Mfg. Co., St. Louis, Mo.

Airid—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Airistocrat—Fan blades. Torrington Mfg. Co., Torrington, Conn.

Airjector—Ventilators. Swartwout Co., Cleveland, O.

Airjet—Ventilators, C. R. Gelert Co., Pasadena, Calif.

Airline—Grilles, registers. Tuttle & Bailey, Inc., New Britain, Conn.

Airmat Arrester—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.

Airmixt—Gas and oil burners. Williams, Inc., F. C., Dearborn, Mich.

Airmover—Ventilators. Swartwout Co., Cleveland, O.

Airo-Flex—Registers. Auer Register Co., Cleveland, O.

Airocool—Burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Airoil—Oil burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Air-o-Line—Indicator-controllers, recorder-controllers. Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

Air-O-Matic—Refrigerating machines, air conditioning units. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.

Airotherm—Zone control thermostat. Tallmadge & Co., Webster, East Orange, N. J.

Airotor—Blower wheels. Torrington Mfg. Co., Torrington, Conn.

Airout—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

Airovent—Gas burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Airridge—Ventilators. Aeolus Dickinson, Chicago, Ill.

Airstat — Regulators. Minneapolis - Honeywell Regulator Co., Minneapolis, Minn.

Airstream—Air filters. Brauer Supply Co., A. G., St. Louis, Mo.

Airstream—Blower wheels. Morrison Products, Inc., Cleveland, O.

Airswitch—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Airtrol—Fans. Air Control Products, Inc., Coopersville, Mich.

Airturn—Duct turning vanes. Barber-Colman Co., Rockford, Ill.

Airvalve—Ventilators. Swartwout Co., Cleveland, O.

Air-Wave—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.

Ajax—Gaskets. United States Gasket Co., Camden, N. J.

Akon—Water treatment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Aktiv—Cleaning compounds. Turco Products, Inc., Los Angeles, Calif.

Alcalex—Water softeners. Research Products Corp., Madison, Wis.

Alco—Ventilators. Lumm Co., A. H., Toledo, O.

Alcoa—Angles, electrodes, sheets, tanks, tubing. Aluminum Co. of America, Pittsburgh, Pa.

Alkacite—Protective coatings. Protective Coatings, Inc., Detroit, Mich.

Alnor—Anemometers, indicator controllers, thermometers. Illinois Testing Laboratories, Chicago, Ill.

Alorco—Dehydrators. Aluminum Co. of America, Pittsburgh, Pa.

Aloyco—Stainless steel fittings, nipples, pipe, tubing, unions, valves. Alloy Steel Products Co., Linden, N. J.

Alternarc—Arc welders. Electric Arc, Inc., Newark, N. J.

Alumaweld—Solder and fluxes. Johnson Co., Lloyd S., Chicago, Ill.

Aluminweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Always Reliable—Benders, cutters, leak detectors, torches, wrenches. Bernz Co., Inc., Otto, Rochester, N. Y.

Amco—Galvanizing powder. American Solder & Flux Co., Philadelphia, Pa.

Amco—Humidifiers, humidistats, hygrometers. American Moistening Co., Providence, R. I.

Amco—Packing. Austin-Mason Co., New York, N. Y.

American—Couplings. American Flexible Coupling Co., Erie, Pa.

American—Furnaces, heaters. American Foundry & Furnace Co., Bloomington, Ill.

American—Gages, recorders, regulators, thermometers, valves. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

American—Meters. American Meter Co., Inc., New York, N. Y.

American—Speed reducers. American Pulley Co., Philadelphia, Pa.

American—Vibration eliminators. American Metal Hose Branch, American Brass Co., Waterbury, Conn.

American—Pumps, water treatment. American Well Works, Aurora, Ill.

American—Pipe benders. American Pipe Bending Machine Co., Inc., Poultney, Vt.

American—Water heater. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Empire—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Oakmont—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Redflash—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Severn—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Standard—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Water Tube—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Ameritherm—Heaters, air conditioning units. American Thermal Industries, Detroit, Mich.

Ames—Pumps. Domestic Engine & Pump Co., Shippensburg, Pa.

Amesteam—Boilers. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.

Aminco—Valves. American Injector Co., Detroit, Mich.

Ammco—Wrenches. Automotive Maintenance Machinery Co., North Chicago, Ill.

Ampac—Arc welders. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Am-Pe-Co—Centrifugal fans. American Machine Products Co., Marshalltown, Ia.

Amtico—Heaters, air conditioning units. American Thermal Industries, Detroit, Mich.

Anaconda—Fittings, pipe, welding rod, sheets, solder, tubing, valves. American Brass Co., Waterbury, Conn.

Anchorjoint—Joints. Magnalastic Div., Cook Electric Co., Chicago, Ill.

Anemo-light—Air diffusers. Anemostat Corp. of America, New York, N. Y.

Ankorite—Packing. Anchor Packing Co., Philadelphia, Pa.
Anti-Sweat—Insulation. Johns-Manville, New York, N. Y.
A-Pe-Co—Blueprint machines. American Photocopy Equipment Co., Chicago, Ill.
Apex—Analyzers, recorders. Uehling Instrument Co., Paterson, N. J.
Apex—Regulators, dampers. Ohio Products Co., Cleveland, O.
Apexior—Coatings. Dampney Co. of America, Boston, Mass.
Aqua-Clear—Water treatment. Sudbury Laboratory, South Sudbury, Mass.
Aqualator—Circulators. Triplex Mfg. Co., Inc., Peru, Ind.
Aqua-Master—Water heaters. Century Engineering Corp., Cedar Rapids, Ia.
Aquamizer—Condensers. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Aquaseal—Cement and compounds. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Aqua-Tite—Seals. Schwitzer-Cummins Co., Indianapolis, Ind.
Aquatone—Treatment, steam and water. Ampion Corp., Long Island City, N. Y.
Aquatrol—Boiler cleaning compounds and water treatment. Aquatic Chemical Laboratories, Inc., New York, N. Y.
Aqulux—Heaters. Johnson Co., S. T., Oakland, Calif.
Arc-Eng—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Arc Heat—Burners. American Heat Corp., Lowell, Mass.
Arco—Hangers, radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arco—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arco—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arctic Circle—Air conditioning units. Goettl Bros. Metal Prod. Co., Phoenix, Ariz.
Arex-Austor—Roof ventilators. Arex Co., Chicago, Ill.
Aridifier—Separators. Logan Engineering Co., Chicago, Ill.
Arin—Louvers and shutters. Arex Co., Chicago, Ill.
Armco—Sheets. American Rolling Mill Co., The, Middletown, O.
Armorak—Insulation. Keasbey Co., Robert A., New York, N. Y.
Arrowtrol—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Art—Direct radiation. The National Radiator Co., Johnstown, Pa.
Artic—Refrigerants. du Pont de Nemours & Co., E. I., Electrochemicals Dept., Wilmington, Del.
Asbestocel—Insulation. Johns-Manville, New York, N. Y.
Asco—Valves, relays, switches. Automatic Switch Co., New York, N. Y.
Ashcroft—Gages. Manning Maxwell & Moore, Inc., Bridgeport, Conn.
At-a-Glance—Gages. Krueger Sentry Gauge Co., Green Bay, Wis.
Athol—Pipe fittings, unions. Leavitt Machine Co., Orange, Mass.
Atlas Western—Fans, furnaces, heaters. International Sales Co., San Francisco, Calif.
Atticvane—Fans. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Auto-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.
Automatic—Tube cleaners. Albright Equipment Co., Johnstown, Pa.
Auto-Tite—Pipe couplings. Superior Railway Products Corp., Pittsburgh, Pa.
Autovent—Eliminators, humidifiers, valves. Maid-O'-Mist, Inc., Chicago, Ill.
Autozone—Zone control unit. Tallmadge & Co., Webster, East Orange, N. J.
Axiflo—Propeller fans. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Axiom—Filters. Blocksom & Co., Michigan City, Ind.

B.A.C.—Condensers. Baltimore Aircoil Co., Baltimore, Md.
B. B.—Blast gates. Berger Bros. Co., Philadelphia, Pa.
B. B.—Electric motors. Brown-Brockmeyer Co., Dayton, O.
B & B—Heating and air conditioning equipment. Bishop & Babcock Mfg. Co., Cleveland, O.
BCA—Bearings. Bearings Co. of America, Lancaster, Pa.
B & C—Plates. Beaton & Corbin Mfg. Co., Southington, Conn.
B. & G.—Air eliminators, circulators, coolers, fittings, hangers, heat exchangers, heaters, regulators, tanks, thermostats, valves. Bell & Gossett Co., Morton Grove, Ill.
B & K—Pipe cutting and threading machines. Bignall & Keeler Machine Works, Edwardsville, Ill.
B & W—Boilers, burners, desuperheaters, fuel economizers, heat exchangers, insulating cement, refractories, stokers, valves. Babcock & Wilcox Co., New York, N. Y.
B & W—Pipe and tubing. Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
B & W—Tubing. Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.

Bacite—Insulation. Bird-Archer Co., Philadelphia, Pa.
Baco—Cleaning compounds, refractories. Bird-Archer Co., Philadelphia, Pa.
Badger—Time switches. Reliance Automatic Lighting Co., Racine, Wis.
Baflex—Enamels and lacquers, protective coatings. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.
Balancer—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Baldwin-Rex—Couplings, chain drives. Chain Belt Co., Milwaukee, Wis.
Balsam-Wool—Insulation. Wood Conversion Co., St. Paul, Minn.
Bankheat—Oil burners. Johnson Co., S. T., Oakland, Calif.
Bar-Brook—Fans, ventilators. Shreveport Engineering Co., Inc., Shreveport, La.
Barcol—Humidistats, motors, operators, regulators, thermostats, valves. Barber-Colman Co., Rockford, Ill.
Barnes—Cutters. Erie Tool Works, Erie, Pa.
Barry—Bearings, pulleys and sheaves. Dick Co., Inc., R. & J., Passaic, N. J.
Bar-Stock—Valves. Reading Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Barton-American — Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Base Ray—Baseboard radiation. Burnham Boiler Corp., Irvington, N. Y.
Basifrit—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Basmor—Boilers. Bastian-Morley Co., Inc., La Porte, Ind.
Battery—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Beacor—Valves. Beaton & Corbin Mfg. Co., Southington, Conn.
Beauticast—Radiation. Columbia Radiator Co., McKeesport, Pa.
Beaverkill—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Bell—Cement. Keasbey & Mattison Co., Ambler, Pa.
Benco—Oil burners. Bennett Co., Omaha, Neb.
Benda Vane—Grilles. Rock Island Register Co., Rock Island, Ill.
Bend-Ezy—Grilles, registers. Standard Stamping & Perforating Co., Chicago, Ill.
Bendmaster—Tubing benders. Leonard Precision Products Co., Garden Grove, Calif.
Benton—Boilers. Combination Boiler Co., Benton Harbor, Mich.
Berloy—Steel sheets. Berger Mfg. Div., Republic Steel Corp., Canton, O.
Bestfelt—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Beth-Co-Weld—Pipe. Bethlehem Steel Co., Bethlehem, Pa.
Beth-Cu-Loy—Sheets. Bethlehem Steel Co., Bethlehem, Pa.
B-H—Insulation. Baldwin-Hill Co., Trenton, N. J.
B-H No. 1—Insulating cement. Baldwin-Hill Co., Trenton, N. J.
B-H No. 100—Pipe insulation. Baldwin-Hill Co., Trenton, N. J.
Bi-Air—Burners. John Zink Co., Tulsa, Okla.
Bifurcator—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Bildrite—Insulation. Insulite Co., Minneapolis, Minn.
Bi-Mix—Burners. John Zinc Co., Tulsa, Okla.
Binoc—Thermometers. Taylor Instrument Companies, Rochester, N. Y.
Bison—Boilers. Farrar & Trefts, Buffalo, N. Y.
Bitumastic—Protective coatings. Wailes-Dove-Hermiston Corp., Westfield, N. J.
Bituplastic—Coatings. Wailes-Dove-Hermiston Corp., Westfield, N. J.
Black Baking Japans—Enamels and lacquers. Hilo Varnish Co., Brooklyn, N. Y.
Black Magic—Welding compounds. Universal Power Corp., Cleveland, O.
Black Magic—Cement and compounds. Bowser, Inc., Fort Wayne, Ind.
Bloapco—Dust collectors. Blower Application Co., Milwaukee, Wis.
Bloflex—Hose. American Ventilating Hose Co., New York, N. Y.
Blowertrol—Speed changers. White Mfg. Co., St. Paul, Minn.
Blu-Cold—Compressors. Lehigh Foundries, Inc., Refrigeration Div., Lancaster, Pa.
Blueknight—Enamels and lacquers. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.
Blue-Point—Tools, wrenches. Snap-On Tools Corp., Kenosha, Wis.
Blue Ribbon—Headers and nipples. Chicago Nipple Mfg. Co., Chicago, Ill.
Blue Streak—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.
Boardman—Pump governors. Locke Regulator Co., Salem, Mass.
Boylout—Cleaning compounds. Apex Engineering Co., Chicago, Ill.
Branford—Unions. Malleable Iron Fittings Co., Branford, Conn.
Brassweld—Compounds. Sight Feed Generator Co., Richmond, Ind.
Brazarc—Electrodes. Universal Power Corp., Cleveland, O.
Brazo—Solder. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.

Breeze Spreader—Propeller fans. Victor Electric Products, Inc., Cincinnati, O.
Breezo—Fans. Buffalo Forge Co., Buffalo, N. Y.
Bro-For—Boiler compounds. Brown-Ford Corp., Newton, Mass.
Bronzend—Electrodes. Arcos Corp., Philadelphia, Pa.
Bronzeweld—Compounds. Sight Feed Generator Co., Richmond, Ind.
Broomell—Eliminators, floats, heating systems, traps, valves. Vapor Specialty Co., New York, N. Y.
Brownweld—Finned tubing. Brown Fintube Co., The, Elyria, O.
BTUnit—Unit heaters. Industrial Mfg. & Engineering Co., Chicago, Ill.
Budget—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Bulldog—Shears and snips. Wiss & Sons Co., J., Newark, N. J.
Bull Dog—Stocks and dies. Oster Mfg. Co., Cleveland, O.
Bull Dog—Pipe and tubing. Phelps Dodge Copper Products, British American Tube Div., New York, N. Y.
Bundyflex—Steel tubing. Everhot Products Co., Chicago, Ill.
Bundyweld—Tubes and tubing. Bundy Tubing Co., Detroit, Mich.
Bunker Hill—Fittings, pipe, sheets, solder. Northwest Lead Co., Seattle, Wash.
Burks—Pumps. Decatur Pump Co., Decatur, Ill.
Burnham—Compressors, condensers, pumps. Union Steam Pump Co., Battle Creek, Mich.

C-E—Boilers, burners, stokers. Combustion Engineering Co., New York, N. Y.
C-H—Controllers and starters, heaters, relays, regulators, switches, valves. Cutler-Hammer, Inc., Milwaukee, Wis.
CJB—Bearings. Ahlberg Bearing Co., Chicago, Ill.
C & M—Hangers or brackets. Carty & Moore Engineering Co., Detroit, Mich.
C & R—Regulators. Automatic Control Co., St. Paul, Minn.
CMH—Bellows. Chicago Metal Hose Corp., Maywood, Ill.
COM—Blowers. Wing Mfg. Co., L. J., New York, N. Y.
CW—Pipe. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Cadillac—Meters. Central Station Steam Co., Detroit, Mich.
Cadman—Valves. Barrett Machine Co., N. S., Pittsburgh, Pa.
Cadwell—Pressure regulators, valves. Beaton & Cadwell Mfg. Co., New Britain, Conn.
Calco—Valves. California Brass Mfg. Co., Los Angeles, Calif.
Calk-N-Seal—Caulking compounds. Blue Ridge Talc Co., Henry, Va.
Calktite—Cement and compounds. U. S. Stoneware Co., New York, N. Y.
Cam-Stat—Theromstats. Henry Co., Paul, The, Controls Div., Los Angeles, Calif.
Cantilever—Hygrometers. Standard Thermometer, Inc., Boston, Mass.
Capacitrols—Indicator-controllers. Wheelco Instruments Co., Chicago, Ill.
Capillary—Air washers, dehumidifiers, humidifiers, unit air conditioners. Air & Refrigeration Corp., New York, N. Y.
Capitol—Boilers, hangers or brackets, heaters, radiation. United States Radiator Corp., Detroit, Mich.
Capitol—Insulation. Standard Lime & Stone Co., Baltimore, Md.
Capitolaire—Furnaces. United States Radiator Corp., Detroit, Mich.
Carbolite—Soot destroyers. Ampion Corp., Long Island City, N. Y.
Carend—Electrodes. Arcos Corp., Philadelphia, Pa.
Careyduct—Ducts and duct fittings. Carey Mfg. Co., Philip, Cincinnati, O.
Carstenite—Insulation. Technical Ply-Woods, Chicago, Ill.
Cash-Acme—Heating systems, pipe strainers, regulators, valves. Cash Valve Mfg. Co., A. W., Decatur, Ill.
Castalu—Fans, wheels. Advance Aluminum Castings Corp., Chicago, Ill.
Castirnare—Electrodes. Universal Power Corp., Cleveland, O.
Cast-Refract—Refractories. Quigley Co., Inc., New York, N. Y.
Catch-All—Filters, dehydrators. Sporlan Valve Co., St. Louis, Mo.
Causul—Valves. Lunkenheimer Co., Cincinnati, O.
Cell-U-Blanket—Insulation. Masonite Corp., Chicago, Ill.
Cellufoam—Insulation. Masonite Corp., Chicago, Ill.
Celoron—Couplings. Continental Diamond Fibre Co., Newark, Del.
Celo-Siding—Insulation. Celotex Corp., The, Chicago, Ill.
Cemcoat—Enamels and lacquers. Sonneborn Sons, Inc., New York, N. Y.
Cementseal—Enamels and lacquers. Acorn Refining Co., Cleveland, O.
Cemesto—Insulation. Celotex Corp., The, Chicago, Ill.

Central—Conduit. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Centrimax—Meters. Leeds & Northrup Co., Philadelphia, Pa.
Centripac—Packing. Johns-Manville, New York, N. Y.
Centripeller—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.
Centrispray—Air conditioning units. Bahnson Co., Winston-Salem, N. C.
Chaco—Cement and compounds, boiler and radiator sealing compounds. Desolvo Co., The, Pittsburgh, Pa.
Challenger—Stokers. Link-Belt Co., Chicago, Ill.
Champion—Furnaces, heaters. National Heater Co., Minneapolis, Minn.
Chem-o-Feeder—Feeders, pumps, steam system and water treatment. % Proportioneers, Inc., % Providence, R. I.
Chevron—Packing. Garlock Packing Co., Palmyra, N. Y.
Chicago—Brakes. Dreis & Krump Mfg. Co., Chicago, Ill.
Chicago—Stokers. Eddy Stoker Corp., Chicago, Ill.
Chicago-Wrigley—Bolts. Chicago Expansion Bolt Co., Chicago, Ill.
Chico Briknet—Cement. Chicago Fire Brick Co., Chicago, Ill.
Chieftain—Compressors. Tecumseh Products Co., Tecumseh, Mich.
Chill-Vactor—Chillers and steam jet compressors. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Chinook—Ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.
Chinookfin—Non-ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.
Chip Chaser—Stocks and dies. Oster Mfg. Co., Cleveland, O.
Chlorend—Electrodes. Arcos Corp., Philadelphia, Pa.
Chore Boy—Burners. Standard Fuel & Engineering Co., Detroit, Mich.
Chromalox—Preheaters, unit heaters. Wiegand Co., Edwin L., Pittsburgh, Pa.
Chrome Lock—Gaskets. Products Research Co., Los Angeles, Calif.
Chromend—Electrodes. Arcos Corp., Philadelphia, Pa.
Chromang—Electrodes. Arcos Corp., Philadelphia, Pa.
Chromeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Chromix—Refractories. Quigley Co., Inc., New York, N. Y.
Chronoflo—Flow meters, recorders. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Chronometer—Valves. Defender Instrument & Regulator Co., St. Louis, Mo.
Chronotherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Cinch—Expansion bolts. National Lead Co., New York, N. Y.
Circle T—Switches. Trumbull Electric Co., The, Plainville, Conn.
Circo—Louvers and shutters, fan housings. Circulators & Devices Mfg. Co., New York, N. Y.
CirCOOLator—Fans, ventilators. Viking Air Conditioning Corp., Cleveland, O.
Clamp-A-Leak—Pipe repair clamps. Chelsea Metal Stamping Co., New York, N. Y.
Clarco—Unit heaters. Clarage Fan Co., Kalamazoo, Mich.
Classic—Registers. Auer Register Co., Cleveland, O.
Cle-Bar—Heaters. Cleghorn Co., Boston, Mass.
Climate Changer—Unit air conditioners, unit air coolers. Trane Co., The, La Crosse, Wis.
Climatrol—Boilers, furnaces, heaters. Mueller Furnace Co., L. J., Milwaukee, Wis.
Closin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Cocheo—Belting. Williams & Son, I. B., Dover, N. H.
Colalloy—Couplings, fittings, flanges, nipples, pipe, valves. Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Cold Stream—Unit air conditioners. Baker Ice Machine Co., Inc., Omaha, Neb.
Columbia—Odor adsorbers. Carbide and Carbon Chemicals Corp., New York, N. Y.
Columbia—Ventilators. E. E. Souther Iron Co., St. Louis, Mo.
Combustioneer—Stokers. Steel Products Engineering Co., Springfield, O.
Comet—Fans, unit heaters. New York Blower Co., Chicago, Ill.
Comfort-Air—Air washers. Comfort Products Corp., Dallas, Tex.
Comfort Panel—Radiation. Columbus Radiator Co., McKeesport, Pa.
Comfortrol—Switches. Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
Comfostat—Thermostats. Johnson Service Co., Milwaukee, Wis.
Co-Min-Co—Insulating cement. United States Mineral Wool Co., Chicago, Ill.
Compact—Boilers. Titusville Iron Works Co., Titusville, Pa.
Compact—Radiation. Kohler Co., Kohler, Wis.
Compass—Belting. Goodyear Tire & Rubber Co., Akron, O.
Conco—Boiler cleaning compounds, water treatment. Continental Products Co., Euclid, O.
Condor—Belting, V belts, pipe. Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Condo-Vac—Vacuum pumps. Chicago Pump Co., Chicago, Ill.
Coni-Vane—Ventilators. Allen Corp., Detroit, Mich.
Consolidated—Valves. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Con-Tac-Tor—Switches. Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Controlled Action—Bellows. Giannini Co., Inc., G. M., Pasadena, Calif.
Control-O-Gas—Valves. Payne Furnace Co., Beverly Hills, Calif.
Convector—Humidifiers. Maid-O-Mist, Inc., Chicago, Ill.
Conveyor—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.
Coolair—Fans. American Coolair Corp., Jacksonville, Fla.
Coolero—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Coolite—Windows. Mississippi Glass Co., New York, N. Y.
Coolmaster—Unit coolers. Kramer Trenton Co., Trenton, N. J.
Copaltite—Cement and compounds, gaskets. National Engineering Products, Inc., Washington, D. C.
Copes—Governors, steam desuperheaters, valves. Northern Equipment Co., Erie, Pa.
Cop-R-Loy—Sheets. Wheeling Steel Corp., Wheeling, W. Va.
Coravol—Corrosion treatment. Western Chemical Co., Kansas City, Mo.
Corkhoustic—Insulation. Armstrong Cork Co., Lancaster, Pa.
Cornelius—Air compressors and regulators. North Penn Co., New York, N. Y.
Corrod:cide—Water treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Corrodine—Corrosion inhibition. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Cottrell—Dust collectors. Research Corp., New York, N. Y.
Cottrell—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Crescent—Boiler gage cocks, Wright-Austin Co., Detroit, Mich.
Crescent—Burner. Caloroll Burner Corp., Hartford, Conn.
Crescent—Unions. Star Mfg. Co., Inc., Providence, R. I.
Crescent—Valves. Powell Co., Wm., Cincinnati, O.
Cromaloy—Solder. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Crown—Cement and compounds. Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Crucibleweld—Electrodes. Westinghouse Electric Corp., East Pittsburgh, Pa.
Crystals—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Cushiontone—Insulation. Armstrong Cork Co., Lancaster, Pa.
Custom-Air—Air conditioning units. Trane Co., The, LaCrosse, Wis.
Cut Master—Vertical turret lathes. Bullard Co., The, Bridgeport, Conn.
Cutno—Packing. Green, Tweed & Co., New York, N. Y.
Cycloidal—Air washers. Blower Application Co., Milwaukee, Wis.
Cycoil—Filters. American Air Filter Co., Louisville, Ky.
Cyclone—Exhaust heads. Wright Austin Co., Detroit, Mich.
Cyclops—Roller bearings. Roller Bearing Co. of America, Trenton, N. J.
Cyclotherm—Boilers. General Furnaces Corp., Oswego, N. Y.

DH—Ball bearings. Dodge Mfg. Corp., Mishawaka, Ind.
D & H—Evaporative condensers, cooling and heating surfaces, unit air conditioners. Drayer & Hanson, Inc., Los Angeles, Calif.
D.I.P.—Durant Insulated Pipe Co., East Palo Alto, Calif.
DV—Speed changers, v-belt drives. Dodge Mfg. Corp., Mishawaka, Ind.
Damit—Caulking compounds. Quigley Co., Inc., New York, N. Y.
Dana—Exhausters, fans, louvers, ventilators. Klee Co., Geo. B., Cincinnati, O.
Dart—Unions. Fairbanks Co., New York, N. Y.
Day-Steel—Pulleys. Dayton Rubber Mfg. Co., Dayton, O.
Dean—Cleaners. Pierce Co., Wm. B., The, Buffalo, N. Y.
Demandtrol—Valves. Sullivan Valve & Engineering Co., Butte, Mont.
Demon Air-Set—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Dereka—Protective coatings. Debevoise Co., The, Brooklyn, N. Y.
De-Sta-Co.—Fan housings, pipe clamps, valves. Detroit Stamping Co., Detroit, Mich.
Detroit—Traps. Nason Co., Detroit, Mich.
Detroit LoStoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Unistoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Dexter—Valve reseaters. Leavitt Machine Co., Orange, Mass.
Di-Acro—Benders, brakes, shears. O'Neil Irwin Mfg. Co., Lake City, Minn.
Dialon—Radiator valves, Bridgeport Brass Co., Bridgeport, Conn.
Diamond Fibre—Gaskets. Continental Diamond Fibre Co., Newark, Del.
Diamond H—Switches, thermostats. Hart Mfg. Co., Hartford, Conn.
Diaphlex—Controls. Cook Electric Co., Chicago, Ill.
Dickbelt—Belting and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickinson Ferrocast—Exhaust heads, ventilators. Aeolus Dickinson, Chicago, Ill.
Dickrope—V belts and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickvalve—Valves. Dick Co., Inc., R. & J., Passaic, N. J.
Dieselite—Corrosion prevention. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Difr-enshal-Vacm—Heating systems. Dunham Co., C. A., Chicago, Ill.
Dike—Furnace cement. Klee Co., Geo. B., Cincinnati, O.
Dilecto—Plastic pipe. Continental Diamond Fibre Co., Newark, Del.
Direct—Pipe fittings and flanges, separators, strainers. Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
Directaire — Heaters. Fitzgibbons Boiler Co. Inc., New York, N. Y.
Discfin—Cooling surface. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Disc-Loc—Registers. Knowles Mushroom Ventilator Co., Montclair, N. J.
Disseminator—Compounds. Ampion Corp., Long Island City, N. Y.
Distributor—Radiation. Kehm Corp., The, Chicago, Ill.
Dixigas—Gas welding rod. Atlantic Steel Co., Atlanta, Ga.
Do-All—Combination hammer and drill. Wodack Electric Tool Corp., Chicago, Ill.
Dominion—Gaskets, packing. Darcoid Co., Inc., New York, N. Y.
Dorex—Adsorbers. W. B. Connor Engineering Corp., New York, N. Y.
Double Check—Boiler compounds. Hampton-Cross Co., The, Louisville, Ky.
Double Diamond—Hygrometers, recorders, psychrometers. H-B Instrument Co., Philadelphia, Pa.
Double-Seal—Copper tube fittings. Hays Mfg. Co., Erie, Pa.
Double U—Packing. Wayne Davies & Co., Westboro, Mass.
Downmetal—Sheets, structural shapes, tubing, welding rod. Dow Chemical Co., Midland, Mich.
Downblast—Unit heaters. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Parke, Boston, Mass.
Down Flo—Unit heaters. McQuay, Inc., Minneapolis, Minn.
Dowtherm—Process heating systems. Dow Chemical Co., The, Midland, Mich.
Draftrite—Gages. Cole-Sewell Engineering Co., St. Paul, Minn.
Draft-O-Stat—Barometric controls. Hotstream Heater Co., Cleveland, O.
Draftrite—Gages. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Drainator—Traps. Coe Mfg. Co., Painesville, O.
Drain-Dri—Sump pumps. Yeomans Bros. Co., Chicago, Ill.
Draintrol—Traps. Schaub Engineering Co., Fred H., Chicago, Ill.
DriAir—Dehumidifiers. Tamms Silica Co., Chicago, Ill.
Drift Retriever—Cooling towers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Dry-Ex—Water chillers. Acme Industries, Inc., Jackson, Mich.
Dry-Ice—Regfrigerants. Pure Carbonic, Inc., New York, N. Y.
Dry-paC—Insulation. Ric-wiL Co., Cleveland, O.
Dryvin—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Dualarc—Arc welders. Electric Arc, Inc., Newark, N. J.
Dual-Clone—Dust collectors. Day Co., The, Minneapolis, Minn.
Dualsteel—Unions. Rockwood Sprinkler Co., Worcester, Mass.
Duboth—Boiler water treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Duco—Enamels and lacquers. du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Ductatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Ductype—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dulux—Enamels and lacquers. du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Duo Blo—Furnaces. American Furnace Co., St. Louis, Mo.
Duoflo—Pipe line strainers. Sheffler-Gross Co., Philadelphia, Pa.

Duo-Stat—Heating systems, thermostats. Johnson Service Co., Milwaukee, Wis.
Duotrol—Regulators. Automatic Control Co., St. Paul, Minn.
Duplex—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Duplex—Pipe cutting machines. Bignall & Keeler Machine Works, Edwardsville, Ill.
Duplex—Pipe line strainers. Maid-O'-Mist, Inc., Chicago, Ill.
Duplex—Tubing. Bridgeport Brass Co., Bridgeport, Conn.
Durabilt—Observation ports. Chicago Fire Brick Co., Chicago, Ill.
DuraBilt—Registers. Auer Register Co., Cleveland, O.
Duradiant—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Dura-Flex—Registers, Auer Register Co., Cleveland, O.
Dura-Fram—Valves. Detroit Lubricator Co., Detroit, Mich.
Dura-Line—Registers. Auer Register Co., Cleveland, O.
Duranite—Enamels and lacquers. Zapon Div., Atlas Powder Co., North Chicago, Ill.
Durant—Pipe. Ehret Magnesia Mfg. Co., Valley Forge, Pa.
DuraSpeed—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Durco—Fans, fittings, joints, pipe, pumps, sheets, valves. Duriron Co., Inc., Dayton, O.
Durcopump—Fans, fittings, joints, pipe, pumps, sheets, valves. Duriron Co., Inc., Dayton, O.
Durex—Bearings. Moraine Products Div., General Motors Corp., Dayton, O.
Durichlor—Fans, fittings, joints, pipe, pumps, sheets, valves. Duriron Co., Inc., Dayton, O.
Durimet—Fans, fittings, joints, pipe, pumps, sheets, valves. Duriron Co., Inc., Dayton, O.
Durobrace—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Duro Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Duroplastic—Caulking compounds. Acorn Refining Co., Cleveland, O.
Dustex—Dust collectors. Dust Filter Co., Chicago, Ill.
Dustkop—Dust collectors. Aget-Detroit Co., Ann Arbor, Mich.
Dust-Stop—Air filters. Owens-Corning Fiberglass Corp., Toledo, O.
Dusttrap—Filters. Morp Industries, Inc., Staten Island, N. Y.
Dustube—Dust collectors. American Foundry Equipment Co., Mishawaka, Ind.
Dutch Boy—Solder. National Lead Co., New York, N. Y.
Duxbak—Leather belting and packing. Schieren Co., Chas. A., New York, N. Y.
Dux-Sulation—Insulation. Wilson Inc., Grant, Chicago, Ill.
Dynaflow—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dynetric—Balancing equipment. Gisholt Machine Co., Madison, Wis.

E-C—V belts. Goodyear Tire & Rubber Co., Akron, O.
E C & M—Motor controls, switches. Electric Controller & Mfg. Co., Cleveland, O.
EMD—Blowers. L. J. Wing Mfg. Co., New York, N. Y.
E.Z.—Hangers or brackets, soot destroyers. Healy Ruff Co., St. Paul, Minn.
Eafco—Fittings. Eastern Foundry Co., Boyertown, Pa.
Eastern—Tanks. Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Easternoil—Oil burners. Eastern Oil Equipment Co., Portland, Me.
Easy-Flo—Solder. Handy & Harman, New York, N. Y.
Easyweld—Electrodes. Universal Power Corp., Cleveland, O.
Ebko—Conduit, jacketed and lined piping. Kaiser Co., E. B., Chicago, Ill.
Eclipse—Alarms, governors, regulators, separators, joints, indicator-controllers, traps, valves. Illinois Engineering Co., Chicago, Ill.
Eclipse—Hose. Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N. J.
Econolux—Boilers. Johnson Co., S. T., Oakland, Calif.
Econ-o-matic—Bases. American Pulley Co., Philadelphia, Pa.
Economizer—Nozzles. Bahnson Co., Winston-Salem, N. C.
Economy—Boilers, heaters. International Heater Co., Utica, N. Y.
Economy—Regulators. Dockson Corp., Detroit, Mich.
Economy—Unit ventilators. Arex Co., Chicago, Ill.
Econovent—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.
Edgeseal—Air filters. Wilson & Co., Inc., Chicago, Ill.
Efco—Heat exchangers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Effico—Louvers and shutters, ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
"88"—Pipe covering. Eagle-Picher Co., Cincinnati, O.
88-A—Pipe vise stands. Nye Tool & Machine Co., Chicago, Ill.

Elasto Rib—Vibration isolating bases. Korfund Co., Inc., Long Island City, N. Y.
El-Bow—Ventilators. Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Electrafluid—Hydraulic speed changers. Link-Belt Co., Philadelphia, Pa.
Electric Filter Watchman—Gages. Herbusch Corp., The, St. Louis, Mo.
Electrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electro-Airmat—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Cell—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Matic—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Hot—Heaters. Red Spot Electric Co., Tacoma, Wash.
Electro-Mist Collector—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Sheet—Sheets. American Brass Co., Waterbury, Conn.
Electro-Wind—Ventilators. Allen Corp., Detroit, Mich.
Electrozone—Ozone apparatus. Automatic Pump & Softener Corp., Rockford, Ill.
Electrunite—Stainless steel tubing. Steel and Tubes, Div. of Republic Steel Corp., Cleveland O.
Elesco—Fuel economizers, superheaters. Combustion Engineering Co., Inc., New York, N. Y.
Elgex—Steam system treatment. Elgin Softener Corp., Elgin, Ill.
Elgin—Arc welders. Borm Mfg. Co., Elgin, Ill.
Elgin—Louvers and shutters. Elgo Shutter & Mfg. Co., Detroit, Mich.
Elite—Registers. Auer Register Co., Cleveland, O.
Elm—Dampers. Elgo Shutter & Mfg. Co., Detroit, Mich.
Elsco—Compressors, pumps. Electric Sprayit Co., The, Sheboygan, Wis.
Elturn—Duct turning vanes. Barber-Colman Co., Rockford, Ill.
Embee—Cement and compounds. Montgomery Bros., San Francisco, Calif.
Emco—Meters, regulators. Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Enamel-Kote—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Enco—Burners, regulators. Engineer Co., New York, N. Y.
Enduro—Pipe, sheets, tubing. Steel and Tubes, Div. of Republic Steel Corp., Cleveland, O.
Enduro—Unions. Jefferson Union Co., Inc., New York, N. Y.
Entrained Combustion—Gas burners. Mettler Co., Lee B., Los Angeles, Calif.
Equatherm—Zone control thermostat. Tallmadge & Co., Webster, East Orange, N. J.
Equiflo—Valves. Grinnell Co., Inc., Providence, R. I.
Eroduct—Insulation. Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Erwin—Dampers. Elgo Shutter & Mfg. Co., Detroit, Mich.
Esna—Nuts. Elastic Stop Nut Corp. of America, Union, N. J.
Esso—Oil burners. Gilbert & Barker Mfg. Co., West Springfield, Mass.
Esso Bond—Refractories. Ramtite Co., The, Chicago, Ill.
Eureka—Valves. Ohio Pattern Wks. & Foundry Co., Eureka Valve Div., Cincinnati, O.
Everlasting—Bolts and studs. H. M. Harper Co., Chicago, Ill.
Evactor—Pumps. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Evapotrol—Valves, Alco Valve Co., St. Louis, Mo.
Evanaction—Valves. Taylor Instrument Companies, Rochester, N. Y.
Everflex—Hose, coils, and tubing. Everhot Products Co., Chicago, Ill.
Everjet—Coatings. Barrett Div., Allied Chemical & Dye Corp., New York, N. Y.
Eversharp—Cutters. Everhot Products Co., Chicago, Ill.
Evertite—Clamps. Everhot Products Co., Chicago, Ill.
Evrtyte—Valves. Strong, Carlisle & Hammond Co., Cleveland, O.
Excel—Unions. Jefferson Union Co., Inc., New York, N. Y
Excelsior—Pumps. Foster Pump Works, Inc., Brooklyn, N. Y.
Excelso—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Exhaustair—Fans. New York Blower Co., Chicago, Ill.
Exidust—Dust collectors. Allen Billmyre Co., Mamaroneck, N. Y.
Extra Dry Esotoo—Liquid sulphur dioxide. Virginia Smelting Co., West Norfolk, Va.
Eye-Hye—Gages. Reliance Gauge Column Co., Cleveland, O.
Eg-arc—Arc welders. Will-Weld Mfg. Co., Inc., Omaha, Neb.
E-Z-ON—Damper quadrants. Gerett Corp., M. A., Milwaukee, Wis.
Ezy-Kleen—Strainers. Blackmer Pump Co., Grand Rapids, Mich.

F & E—Stokers. Flynn & Emrich Co., Baltimore, Md.
Fabrikated—Grilles, registers. Independent Register Co., Cleveland, O., New York, N. Y.
Faircoseal—Valves. Fairbanks Co., New York, N. Y.
Fan-Air—Gas burners. Mettler Co., Lee B., Los Angeles, Calif
Fan-Pac—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Fanmix—Burners. Coppus Engineering Corp., Worcester, Mass.
Far-Air—Air conditioning units, filters, humidifiers. Farr Co., Los Angeles, Calif.
Farnsworth—Pumps. O'Brien Steam Specialty Co., Syracuse, N. Y.
Farragut—Packing. Darcoid Co., Inc., New York, N. Y.
Fast's—Couplings. Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Favorite—Ratchet wrenches. Greene, Tweed & Co., New York, N. Y.
Featherfin—Heating and cooling surface. Wing Mfg. Co., L. J., New York, N. Y.
Featherweight—Propeller fans. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Featherweight—Unit heaters. Wing Mfg. Co., L. J., New York, N. Y.
Fel-Pro—Gaskets, packing. Felt Products Mfg. Co., Chicago, Ill.
Felt Cote—Metal sheets. American Steel Band Co., Pittsburgh, Pa.
Fenestra—Heat insulating windows. Detroit Steel Products Co., Detroit, Mich.
Fenn's Rotary—Ventilators. Waverly Heating Supply Co., Boston, Mass.
Fenox—Compounds. Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.
Fero—Radiation. Burnham Boiler Corp., Irvington, N. J.
Ferrenewo—Valves. Lunkenheimer Co., Cincinnati, O.
Ferroclad—Insulation. Truscon Steel Company, Youngstown, O.
Ferro-Therm—Insulation. American Flange & Mfg. Co., Inc., New York, N. Y.
Ferroweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Fiberglas—Insulation. Owens-Corning Fiberglas Corp., Toledo, O.
Fiberlite—Insulation. Insulite Co., Minneapolis, Minn.
Fibrun—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Filmflo—Deaerators. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Fine-screen—Strainers. Yarnall-Waring Co., Philadelphia, Pa.
Fin-Flex—Registers. Auer Register Co., Cleveland, O.
Findlay—Stokers. Central Rubber & Steel Corp., Findlay, O.
Finstrip—Heaters. Wiegand Co., Edwin L., Pittsburgh, Pa.
Firecrete—Refractories. Johns-Manville, New York, N. Y.
Fire-Felt—Insulation. Johns-Manville, New York, N. Y.
Fire-Guard—Stokers. Peerless Mfg. Corp., Louisville, Ky.
Fire-Hearth—Refractories. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Fire Tender—Stokers. Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
Firefoil—Insulating panel. Carey Mfg. Co., Philip, Cincinnati, O.
Firelte—Furnace cement refractories. Johns-Manville, New York, N. Y.
Fireline—Refractories. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Fireset—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Fireye—Alarms, flame failure controls. Combustion Control Corp., Cambridge, Mass.
Firomatic—Filters, gages, links. Morse-Smith-Morse, Inc., Watertown, Mass.
Firma—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Flash-off—Compounds. Acme Industries, Inc., Jackson, Mich.
Flame-otrol—Controls. Wheelco Instruments Co., Chicago, Ill.
Flaremaster—Benders. Everhot Products Co., Chicago, Ill.
Flat Belt—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.
Flatjet—Spray nozzles. Spraying Systems Co., Chicago, Ill.
Fleetweld—Welding electrodes. Lincoln Electric Co., Cleveland, O.
Fleet-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Flexarc—Arc welders. Westinghouse Electric Corp., East Pittsburgh, Pa.
Flexair—Grilles, registers. Tuttle & Bailey, Inc., New Britain, Conn.
Flexaust—Hose. American Ventilating Hose Co., New York, N. Y.
Flexcord—Drives. Gates Rubber Co., Denver, Col.
Flexeal—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Flexiblac—Protective coatings. Samuel Cabot, Inc., Boston, Mass.
Flexigrip—Fittings. Gustin Bacon Mfg. Co., Kansas City, Mo.
Flexiwound—Gaskets. Asor Corp., Irvington, N. J.

Flexodisc—Expansion joints. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Floatrol—Switches, regulators. Automatic Control Co., St. Paul, Minn.
Flex-Tube—Analyzers, gages, manometers. Dwyer Mfg. Co., F. W., Chicago, Ill.
Flo-Gage—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Flo-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.
Flo-scope—Meters. Selas Corp. of America, Philadelphia, Pa.
Flotrol—Humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.
Flo-watch—Flow meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Flowrator—Meters. Fischer & Porter Co., Hatboro, Pa.
Flualyzer—Analyzers. Engelhard, Inc., Chas., Newark, N. J.
Flush-Kleen—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Foamglas—Insulation. Armstrong Cork Co., Lancaster, Pa.
Foamglas—Insulation. Pittsburgh Corning Corp., Pittsburgh, Pa.
Foamglas—Insulation. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Force-Flo—Circulators, fittings, heaters, regulators, systems, tanks. Kehm Corp., The, Chicago, Ill.
Fordair—Compressors. Schramm, Inc., West Chester, Pa.
Forest Fleece—Insulation. Doheny Co., John J., Belmont, Mass.
4-Point—Control systems. Perfex Corp., Milwaukee, Wis.
"400" Series—Heaters. Fitzgibbons Boiler Co., Inc., New York, N. Y.
Fracto-Crete—Refractories. Ramtite Co., The, Chicago, Ill.
Francke—Flexible couplings. Waldron Corp., John, New Brunswick, N. J.
Franzite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Free-Aire—Air conditioning units, heaters. Kehm Corp., The, Chicago, Ill.
Free-Flow—Ventilators. Burt Mfg. Co., Akron, O.
Fre-Flo—Strainers. Fisher Governor, Marshalltown, Ia.
Freon—Refrigerant. Kinetic Chemicals, Inc., Wilmington, Del.
Fresh Air Maker—Propeller fans, units, ventilators. Schwitzer-Cummins Co., Indianapolis, Ind.
Frevent—Valves. Bridgeport Brass Co., Bridgeport, Conn.
Frictionized—Belting. Baldwin Belting, Inc., New York, N. Y.
Frigid—High pressure blowers, propeller fan blades and fans, painting spray booths, air conditioning units, ventilators. Circulators & Devices Mfg. Corp., New York, N. Y.
Frigistat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Frigitower—Cooling towers. Thermal Industries, Indio, Calif.
Frostaire—Air conditioning units. Palmer Mfg. Corp., Phoenix, Ariz.
Fuel Saver—Boilers. International Boiler Works Co., East Stroudsburg, Pa.
Fuelsaver—Boilers. Columbia Radiator Co., McKeesport, Pa.
Fulflo—Filters. Commercial Filters Corp., Boston, Mass.
Fulljet—Spray nozzles. Spraying Systems Co., Chicago, Ill.
Fulscope—Recorders, recorder-controllers, regulators. Taylor Instrument Companies, Rochester, N. Y.
Fybr-Tech—Gaskets and sheets. Technical Ply-Woods, Chicago, Ill.
Fyr-Feeder—Spreader stokers. American Coal Burner Co., Chicago, Ill.
Fyrite—Analyzers. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Fyritec—Recorders. Cole-Sewell Engineering Co., St. Paul, Minn.

G. B. C.—Fans. General Blower Co., Inc., Philadelphia, Pa.
G-E—Compressors, condensers, thermostats. General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
G-M—Louvers and shutters. Gillian Mfg. Co., Detroit, Mich.
G-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
G-R—Aftercoolers, oil coolers, water chillers, regulators. Griscom-Russell Co., The, New York, N. Y.
G-R—Unit coolers and air conditioners. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Galongage—Gages. Applied Mechanics Co., Boston, Mass.
Galv-O-Zinc—Coatings. Blue Ridge Talc Co., Henry, Va.
Gaco-Neoprene—Blades, coatings, fittings, hose, housings, pipe, valves. Gates Engineering Co., Wilmington, Del.
Gaco-Innerseal—Couplings. Gates Engineering Co., Wilmington, Del.
Gasgun—Torches. Century Aircraft, Inglewood, Calif.
Gast—Filters, separators. Johnson Corp., Three Rivers, Mich.
Gasweld—Torches, welding rod and apparatus. Liquid Carbonic Corp., The, Chicago, Ill.
Gasweld—Welding and cutting apparatus. Ergolyte Mfg. Co., Philadelphia, Pa.
Geddes—Radiation. Fowler & Wolfe Radiator Co., Norristown, Pa.
Gemaco—Compressors. General Machinery Co., Spokane, Wash.
Gemco—Bolts, hangers and supports, insulation. Goodloe E. Moore Co., Danville, Ill.
Gemco—Air conditioning units. General Engineering & Mfg. Co., St. Louis, Mo.
Gemware—Hygrometers, psychrometers, thermometers. G. M. Mfg. Co., New York, N. Y.
Genuine Stillson—Wrenches. Walworth Co., New York, N. Y.
Gerotor—Rotary pumps. May Oil Burner Corp., Baltimore, Md.
Giant—Radiation. John J. Nesbitt, Inc., Philadelphia, Pa.
Giant—Radiator hangers. Western Hanger Co., San Francisco, Calif.
Gilbarco—Compressors, oil burners. Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gilsonite—Protective coatings. Ohmlac Paint & Refining Co., Chicago, Ill.
Gilt Edge—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Gland-Pakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Glazola—Caulking compounds. Nebel Mfg. Co., Cleveland, O.
Globak—Pipe flanges. Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Glowan—Gas burners. Martin. J. O. & C. U. San Francisco, Calif.
Gloweld—Welded steel tubing. Globe Tubes Co., Milwaukee, Wis.
Goetzerit—Packing. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Gohi—Sheets. Newport Rolling Mill Co., Newport, Ky.
Gold Bond—Insulation. National Gypsum Co., Buffalo, N. Y.
Goodyearite—Packing. Goodyear Tire & Rubber Co., Akron, O.
Grad-U-Motor—Damper operators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradustat—Regulators, thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradutrol — Diaphragm valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Graylite—Insulation. Insulite Co., Minneapolis, Minn.
Greastop—Air filters. Air-Maze Corp., Cleveland, O.
Grid—Cooling and heating surface condensers, radiation, unit heaters. Murray Mfg. Co., D. J. Wausau, Wis.
Grillometer—Direct reading air velocity meters. Detroit Air Conditioning Service Co., Detroit, Mich.
Gripsins—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Gritseald—Rotary pumps. St. Louis Tool Co., St. Louis, Mo.
Gross-Aire—Furnaces. Grossenbacher Furnace Co., Overland, Mo.
Gruvagrip—Couplings. Gustin Bacon Mfg. Co., Kansas City, Mo.
Guardian—Gaskets. Garlock Packing Co., Palmyra, N. Y.
Gunmix—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
GunPakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Guthfan—Fans. Guth Co., Edwin F., St. Louis, Mo.

H & C—Grilles, registers. Hart & Cooley Mfg. Co., Holland, Mich.
H-O-H—Compounds, feeders, steam system and water treatment. Haering & Co., Inc., D. W., Chicago, Ill.
H-T—Smoke alarms, Autempco Corp., New York, N. Y.
Hairbestos—Insulation. Wilson & Co., Inc., Chicago, Ill.
Haircraft—Insulation. Wilson & Co., Inc., Chicago, Ill.
Hammerkraft—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Hammermill—Belting. Goodyear Tire & Rubber Co., Akron, O.
Hammer-On—Damper quadrants. Air Control Products, Inc., Coopersville, Mich.
Hammer-Set—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Hancock—Valves. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Handy—Benders. Holsclaw Bros., Inc., Evansville, Ind.
Handy—Ducts and duct fittings. Meyer & Bro. Co., F., Peoria, Ill.
Handy Andy—Vise stands. Western Wire Products Co., St. Louis, Mo.
Hardweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Hartman—Air conditioning units. Norwood Filtration Co., The, Florence, Mass.
Hartmann—Heaters. Montgomery Bros., San Francisco, Calif.
Haveg—Tanks. Continental Diamond Fibre Co., Newark, Del.
Hazleton—Pumps, strainers, valves. Barrett, Haentjens & Co., Hazleton, Pa.
Heacon—Dampers. Thermix Engineering Co., Greenwich, Conn.
Health-Air—Ventilator and filter units. Reliable Sheet Metal Engineering Co., Chicago, Ill.
Health-Aire—Fans, heaters, unit coolers, ventilators. Johnson Fan & Blower Co., Chicago, Ill.
Health-Crete—Refractories. Quigley Co., Inc., New York, N. Y.
Hearth Patch—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Heart-Oak—Belting. Graton & Knight Co., Worcester, Mass.
Heat-aid—Refractories. Pyrolite Products Co., Uniontown, Pa.
Heatomat—Heaters. Richmond Radiator Co., Gas Products Div., New York, N. Y.
Heat-O-Meter—Temperature regulators, thermostats. Miller Heat-O-Meter Co., Milwaukee, Wis.
Heatrex—Heaters. Whiting Stoker Sales Co., Chicago, Ill.
Heat-Rite—Registers. Auer Register Co., Cleveland, O.
Heat-Tite—Insulating cement. Ramtite Co., The, Chicago, Ill.
Helical—Tubing. Rome-Turney Radiator Co., Rome, N. Y.
Hellite—Refractories. Johns-Manville. New York, N. Y.
Herco—Arc welders. Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Herculoy—Welding rod, tubing. Revere Copper and Brass, Inc., New York, N. Y.
Hevikoat—Electrodes. Universal Power Corp., Cleveland, Ohio.
Highflex—Belting. Goodrich Co., B. F., Akron, O.
High-Ten-500—Solder. Industrial Service Laboratories, Milwaukee, Wis.
Hi-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Hilger—Chillers, refrigerating compressors, unit coolers, unit air conditioners, valves. XL Refrigerating Co., Inc., Chicago, Ill.
Hi-Lift—Pumps. Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Hi-Lo—Alarms. Yarnell-Waring Co., Philadelphia, Pa.
Hi-Lo—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hi-Seal—Cement and compounds. Greene, Tweed & Co., New York, N. Y.
Hi-Spra—Spray nozzles. Thermal Industries, Indio, Calif.
Hitchings—Boilers. Burnham Boiler Corp., Irvington, N. Y.
Hi-Temp—Insulation. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Hi-Test—Boilers. Kewanee Boiler Co., Kewanee, Ill.
Hoffman—Water heaters. Clayton & Lambert Mfg. Co., Louisville, Ky.
Holdtite—Solder. American Brass Co., Waterbury, Conn.
Holgun—Drills. Van Dorn Electric Tool Co., Towson, Md.
Hollo-Tech—Doors and panels. Technical Ply-Woods, Chicago, Ill.
Holt—Strainers, tube cleaners. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Holtite—Clamps. Yarnall-Waring Co., Philadelphia, Pa.
Horneblende—Caulking compounds. North American Fibre Products Co., The, Cleveland, O.
Horton—Tanks. Chicago Bridge & Iron Co., Chicago, Ill.
Hot Shot—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hot Spot—Spot welders. Acme Electric Welder Co., Los Angeles, Calif.
Hotpoint—Water heaters. Edison General Electric Appliance Co., Inc., Chicago, Ill.
Hovalco—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Huber—Stokers. Flynn & Emrich Co., Baltimore, Md.
Humiclean—Cleaning compounds, water treatment. Carolina Aniline & Extract Co., Charlotte, N. C.
Humidair—Humidifiers. Skilbeck Mfg. Co., Kenosha, Wis.
Humidigraph—Humidity recorders. Bristol Co., Waterbury, Conn.
Humidiguide—Hygrometers. Taylor Instrument Companies, Rochester, N. Y.
Humidostat—Humidistats. Johnson Service Co., Milwaukee, Wis.
Humiduct—Humidifiers, unit air conditioners. Bahnson Co., Winston-Salem, N. C.
Humi-Temp—Unit air coolers. Larkin Coils, Atlanta, Ga.
Humphrey—Unit heaters. General Gas Light Co., Kalamazoo, Mich.
Hurrivent—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Hycarb—Electrodes. Universal Power Corp., Cleveland, O.
Hydra—Valves. Albright Equipment Co., Johnstown, Pa.
Hydralt—Protective coatings. Flintkote Co., The, New York, N. Y.
Hydramotor—Valves. General Controls Co., Glendale, Calif.

Hydro—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Hydro-Clone—Dust collectors, welding fume exhausters. Whiting Corp., Harvey, Ill.
Hydro-Flo—Heating systems. Bell & Gossett Co., Morton Grove, Ill.
Hydro-Foil—Pumps. Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Hydron—Bellows, traps. Clifford Mfg. Co., Boston, Mass.
Hydrovac—Pumps. Ames Hydrovac Inc., Brooklyn, N. Y.
Hydro-Whirl—Dust collectors, spray booths. Peters-Dalton, Inc., Detroit, Mich.
Hydryer—Dehumidifiers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Hy-Duty—Blower wheels, fans. Schwitzer-Cummins Co., Indianapolis, Ind.
Hy-Power—Shears and snips. Wiss & Sons Co., J., Newark, N. J.
Hy-Speed—Pipe vises. Munton Mfg. Co., Franklin Park, Ill.
Hy-Temp—Cement, insulation. Keasbey & Mattison Co., Ambler, Pa.
Hytempite—Cement, refractories. Quigley Co., Inc., New York, N. Y.
Hy-Test—Water heaters. Smith Co., Inc., H. B., The, Westfield, Mass.

I-R—Ingersoll-Rand, New York, N. Y.
IVCO—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.
Ice Engine—Gas and diesel engines. Waukesha Motor Co., Waukesha, Wis.
Ice-O-Matic—Refrigerating compressors. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
Icy-Flo—Accumulators. McQuay, Inc., Minneapolis, Minn.
Ideal—Blowers. Perfection Grate & Stoker Co., Springfield, Mass.
Ideal—Speed changers, pulleys and sheaves. Lovejoy Flexible Coupling Co., Chicago, Ill.
Ideal—Traps. Nason Co., Detroit, Mich.
Immersatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Impact—Spray nozzles. Cooling Tower Co., Inc., The, Div. of the Fluor Corp., Ltd., New York, N. Y.
Imperial—Boilers. National Radiator Co., The, Johnstown, Pa.
Impulse—Traps. Yarnall-Waring Co., Philadelphia, Pa.
Inco—Electrodes, pipe fittings, pipe, rod, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Inconel—Pipe fittings, pipe, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Indeeco—Heaters. Industrial Engineering & Equipment Co., St. Louis, Mo.
IngAclad—Stainless clad sheets. Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
In-Hib-Co—Protective coatings. Haering & Co., Inc., D. W., Chicago, Ill.
Inkstop—Air filters. Air-Maze Corp., Cleveland, O.
Ins-lite—Insulation. Insulite Co., Minneapolis, Minn.
Instant—Heaters, preheaters. Johnson Corp., Three Rivers, Mich.
Insulag—Insulation. Quigley Co., Inc., New York, N. Y.
Insulbrix—Refractories. Quigley Co., Inc., New York, N. Y.
Insulcrete—Insulating cement, refractories. Quigley Co., Inc., New York, N. Y.
Insulduct—Ducts and duct fittings. Smith-Raymond Co., Columbus, Ga.
Insulfil—Insulation. Refractory & Insulation Corp., New York, N. Y.
Insulwool—Insulation. General Insulating Products Co., Brooklyn, N. Y.
Insutube—Insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Integral Jet—Burners. Stout & Sons, David, St. Louis, Mo.
Intensarc—Electrodes. National Carbon Co., New York, N. Y.
Inter-Matic—Time switches. International Register Co., Chicago, Ill.
Involute—Spray nozzles. Yarnall-Waring Co., Philadelphia, Pa.
Ionaire—Ionization apparatus. Electroaire Corp., Chicago, Ill.
Irenew—Powell Co., Wm., Cincinnati, O.
Iron Lung—Ventilators. Powermatic Ventilator Co., Cleveland, O.
Ironset—Furnace cement. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Ironweld—Compounds. Sight Feed Generator Co., Richmond, Ind.
Irv-u-lite—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Isomodes—Bases and pads. M. B. Mfg. Co., The, New Haven, Conn.

J & C—Burners, fans, furnaces, heaters. Jackson & Church Co., Saginaw, Mich.
J. B.—Pumps. Pacific Pump Works, Huntington Park, Calif.
J F S—Speed changers. Stephens-Adamson Mfg. Co., Aurora, Ill.
J-M Ball—Floats, traps. Cryer Trap & Valve Co., Inc., New York, N. Y.
Jacobus—Valves. Majot Automatic Machine Co., Inc., East Orange, N. J.
Janitrol—Boilers, burners, heaters, unit air conditioners. Surface Combustion Corp., Toledo, O.
Jarco—Unions, valves. Jarecki Mfg. Co., Erie, Pa.
Jay Gee Silica Gel—Dehydrators. Joliet Chemicals, Inc., Joliet, Ill.
Ject-O-Valve — Ventilators. Swartwout Co., Cleveland, O.
Jennings—Pumps, ejectors. Nash Engineering Co., South Norwalk, Conn.
Jetal—Protective coatings. Alrose Chemical Co., Providence, R. I.
Jetcote—Protective coatings. Watson-Standard Co., Pittsburgh, Pa.
Jiffy Clips—Hangers and supports. Minerallac Electric Co., Chicago, Ill.
Jiffy "Dial"—Regulators. Parker-Kalon Corp., New York, N. Y.
John Crane—Cement and compounds. Crane Packing Co., Chicago, Ill.
Jointite—Insulation. Mundet Cork Corp., Brooklyn, N. Y.
Jones—Stokers. Riley Stoker Corp., Worcester, Mass.
Junior — Radiation. Weil-McLain Co., Chicago, Ill.
Jusrite—Ducts and duct fittings. Corbman Bros., Inc., Philadelphia, Pa.

K—Fittings. Kuhns Brothers Co., Dayton, O.
K. A. T.—Compounds and water treatment. American K.A.T. Corp., New York, N. Y.
K-B—Dampers, regulators. Kerentoff, G. L., Cincinnati, O.
K-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
K-G Leak-Pruf—Gages. King Gauge & Mfg. Co., New Haven, Conn.
K and M—Alarms, controls, strainers, traps, valves. Kieley & Mueller, Inc., North Bergen, N. J.
K-S-V—Ventilators. Kernchen Co., Chicago, Ill.
Kable Kord—Belting. Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Kane—Boilers. Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Karbate—Carbon pipe, heat exchangers, pumps. National Carbon Co., New York, N. Y.
Kathabar—Dehumidifiers, humidifiers, unit air conditioners. Surface Combustion Corp., Toledo, O.
Kaukit—Caulking compounds. Sonneborn Sons, Inc., L., New York, N. Y.
Kearsarge—Gaskets, packing. Johns-Manville, New York, N. Y.
Kemtex—Water softener. MacDermid Chemical Co., Bristol, Conn.
Kentucky—Sheets. Newport Rolling Mill Co., Newport, Ky.
Key-Tite—Cement and compounds. Key Co., East St. Louis, Ill.
Kidskin—Packing. Darcoid Co., Inc., New York, N. Y.
Kimsul—Insulation. Kimberly-Clark Corp., Neenah, Wis.
King-clip—Valves. Lunkenheimer Co., Cincinnati, O.
King-Gage—Gages. King Engineering Corp., Ann Arbor, Mich.
Kleen Air—Air filters. Kaye & MacDonald, Inc., West Orange, N. J.
Kleen Tube—Heaters. Vapor Car Heating Co., Inc., Chicago, Ill.
Kleenflo—Unit air filters. Air-Maze Corp., Cleveland, O.
Klingtite—Belting. Goodyear Tire & Rubber Co., Akron, O.
Klixon—Temperature controls. Spencer Thermostat Co., Attleboro, Mass.
Klondike—Arc welders. Fern, Ralph, Scranton, Pa.
Klosd—Motors. Sterling Electric Motors, Inc., Los Angeles, Calif.
K-Master—Strainers, traps, valves. Kaye & MacDonald, Inc., West Orange, N. J.
Knight-Ware—Pipe, prefabricated ducts, valves. Knight, Maurice A., Akron, O.
Knock-Out—Arc welders. Lee Co., K. O., Aberdeen, S. D.
Kno-Draft—Air diffusers. Connor Engineering Corp., W. B., New York, N. Y.
Kool-Shade—Solar heat resisting screens. Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Kooler-Aire — Commercial air conditioners. United States Air Conditioning Corp., Minneapolis, Minn.
Korektors—Controls. Cole-Sewell Engineering Co., St. Paul, Minn.
Korolac—Protective coatings. Goodrich Co., B. F., Akron, O.
Koroseal—Plastic tubing, protective coatings. Goodrich Co., B. F., Akron, O.
Koven—Heaters, tanks. Waterfilm Boilers, Inc., Jersey City, N. J.
Kristokrak—Enamels and lacquers. Zapon Div., Atlas Powder Co., North Chicago, Ill.
Kwikflux—Solder. Special Chemicals Corp., New York, N. Y.

L. A.—Motors. The Louis Allis Co., Milwaukee, Wis.
L M—Tubing. Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
L&N—Regulators. Leeds & Northrup Co., Philadelphia, Pa.
L-R—Couplings. Lovejoy Flexible Couplings Co., Chicago, Ill.
L. R. D.—Valves. Grinnel Co., Inc., Providence, R. I.
Laddi—Heaters. Johnson Co., S. T., Oakland, Calif.
Lamneck—Ducts and duct fittings. Clayton & Lambert Mfg. Co., Middletown, O.
Lawson—Wrenches. USHCO Mfg. Co., Inc., Buffalo, N. Y.
Lead-Sealed—Lead sheets. Continental Steel Corp., Kokomo, Ind.
Leaflex—Enamels and lacquers. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.
Lectrodryer—Dehumidifiers. Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.
Ledaloyl—Sleeve bearings. Johnson Bronze Co., New Castle, Pa.
Levelometer—Gages, recorders. Liquidometer Corp., Long Island City, N. Y.
Level-Trol—Regulators. Fisher Governor Co., Marshalltown, Ia.
Liberty—Packing. Johns-Manville, New York, N. Y.
Liberty—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Light Duty—Pulleys. Gates Rubber Co., The, Denver, Colo.
Lightning—Cleaning compounds. Western Chemical Co., Kansas City, Mo.
Lightweight Champion—Pipe cutting machines. Nye Tool & Machine Co., Chicago, Ill.
Lightweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Lima—Stokers. Carnes, Inc., John R., Lima, O.
Limit-Load—Centrifugal fans. Buffalo Forge Co., Buffalo, N. Y.
Limitorque—Valves. Philadelphia Gear Works, Inc., Philadelphia, Pa.
Limpet—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Line-o-flo—Grilles. Barber-Colman Co., Rockford, Ill.
Lin-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Lipco—Cement lined fittings and pipe. Cement Lined Pipe Co., Lynn, Mass.
Lipman—Compressors, cooling surface, water chillers. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Liquivator—Steam traps. Morehead Mfg. Co., Detroit, Mich.
Liquon—Filters. Liquid Conditioning Corp., New York, N. Y.
Little Blacksmith—Punches, shears. Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
Little Giant—Stocks and dies. Greenfield Tap & Die Corp., Greenfield, Mass.
Little Giant—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Livermont—Wrenches. Richmont, Inc., Los Angeles, Calif.
Lloyd—Solder and fluxes. Johnson Co., Lloyd S., Chicago, Ill.
Lo-Blast—Burners. Mid-Continent Metal Products Co., National Gas Burners Div., Chicago, Ill.
Locarb—Electrodes. Universal Power Corp., Cleveland, O.
Lockaire—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.
Lockseam—Pipe. Naylor Pipe Co., Chicago, Ill.
Locktite—Regulators, dampers. Ohio Products Co., Cleveland, O.
Lodi—Boilers. Super Mold Corp., Lodi, Calif.
Lok-Joint—Insulation. Insulite Co., Minneapolis, Minn.
Lolag—Heaters. American Instrument Co., Silver Spring, Md.
Lo-Maintenance—Motors and starters. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Longrip—Pipe extractors. Ridge Tool Co., Elyria, O.
Lookout Heggie-Simplex — Boilers. Lookout Boiler & Mfg. Co., Chattanooga, Tenn.
Lord Burnham—Boilers. Burnham Boiler Corp., Irvington, N. Y.
Lornate — Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Lowcost—Boilers. Murray Iron Works Co., Burlington, Ia.
Loxin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Lubricore—Packing. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Luminarc—Electrodes. Universal Power Corp., Cleveland, O.
Lyonore—Sheets. Lyon, Conklin & Co., Inc., Baltimore, Md.

M. E.—Motors. Marathon Electric Mfg. Corp., Wausau, Wis.
M. & E.—Refrigerating compressors and condensers, unit coolers. Merchant & Evans Co., Philadelphia, Pa.
M & F—Rubber base enamel. American-Marietta Co., Chicago, Ill.

M & M—Alarms, cut-offs, feeders, humidifiers, operators, switches, valves. McDonnell & Miller, Inc., Chicago, Ill.
M & S—Gaskets. Mitchell & Smith, Inc., Detroit, Mich.
MIF—Couplings, fittings. Malleable Iron Fittings Co., Branford, Conn.
MKO—Pumps. Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
M-R-C—Ball bearings. Marlin-Rockwell Corp., Jamestown, N. Y.
MTB—Oil burners. John Zinc Co., Tulsa, Okla.
M/W and A/C Airmat—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Machete—Fans, fan blades, ventilators. Aerovent Fan Co., Piqua, O.
Magic—Cement and compounds. Blue Ridge Talc Co., Henry, Va.
Magic-Grip—Sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Magic-Weather—Air washers, fans. Ballantyne Co., Omaha, Neb.
Magna-Fin—Direct radiation. Rittling Corp., The, Buffalo, N. Y.
Magnefer—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Manganend—Electrodes. Arcos Corp., Philadelphia, Pa.
Manganweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Mangenarc—Electrodes. Universal Power Corp., Cleveland, O.
Mani-Ply—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Mark Time—Time switches, time delay relays. Rhodes, Inc., M. H., Hartford, Conn.
Marsalis—Dust collectors, fans, pumps, ventilators, air conditioning units. American Metal Products Co., Fort Worth, Tex.
Martell—Packing. France Packing Co., Tacony, Philadelphia, Pa.
Manu-Rod—Pipe cleaning machines. Spartan Tool Co., Chicago, Ill.
Marvair—Air conditioning units. Muncie Gear Works, Muncie, Ind.
Marval—Valves. Marsh Heating Equipment Co., Div. of Marsh Corp., Jas. P., Chicago, Ill.
Masco—Combustion chambers. Munn & Steel, Inc., Newark, N. J.
Mascobond—Furnace cement. Munn & Steele, Inc., Newark, N. J.
Mascocement—Refractories. Munn & Steele, Inc., Newark, N. J.
Mascokast—Refractories. Munn & Steele, Inc., Newark, N. J.
Mascolite—Pipe insulation. Munn & Steele, Inc., Newark, N. J.
Mascote—Insulation. Munn & Steele, Inc., Newark, N. J.
Massachusetts—Fans, unit heaters, blower wheels, air washers, housings. Bishop & Babcock Mfg. Co., Cleveland, O.
Master—Stokers. Muncie Gear Wks., Inc., Muncie, Ind.
Master—Speed changers, controls, thermostats, regulators, switches. White Mfg. Co., St. Paul, Minn.
Master—Unions. Jefferson Union Co., Inc., New York, N. Y.
Master Kraft—Oil burners. Harvey-Whipple, Inc., Springfield, Mass.
Master Pilot—Valves. Powell Co., Wm., Cincinnati, O.
McDaniel—Floats, traps. Watson & McDaniel Co., Philadelphia, Pa.
McKee—Blowers, boilers, burners, feeders, pumps, regulators, tanks, torches, valves. Eclipse Fuel Engineering Co., Rockford, Ill.
McKeesport—Radiation. Columbia Radiator Co., McKeesport, Pa.
McKnight—Registers. Tuttle & Bailey, Inc., New Britain, Conn.
Measurrench—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Mechanovent—Ventilators. New York Blower Co., Chicago, Ill.
Meco—Torches, welding rod. Modern Engineering Co., St. Louis, Mo.
Melloblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Mel-Rock—Humidifiers, units, ventilators, washers. Mellish & Murray Co., Chicago, Ill.
Merrill Process—Heating systems. Parks-Cramer Co., Fitchburg, Mass.
Metal-Master—Shears. Wiss & Sons Co., J., Newark, N. J.
Metco—Ducts and duct fittings. Sheet Metal Mfg. Co., Inc., Brooklyn, N. Y.
Metermax—Combustion control systems. Leeds & Northrup Co., Philadelphia, Pa.
Metl-Tech—Doors and panels, metal sheets. Technical Ply-Woods, Chicago, Ill.
Metric—Meters. American Meter Co. Inc., New York, N. Y.
Metrotherm—Thermostats. General Controls Co., Glendale, Calif.
Micafil—Insulation. Munn and Steele, Inc., Newark, N. J.
Mico—Insulation. Mineral Insulation Co., Chicago Ridge, Ill.
Micro—Low water cut-offs. Maid-O-Mist, Inc., Chicago, Ill.
Micro-Feed—Humidifiers. Cleveland Humidifier Co., Cleveland, O.
Micromax—Hygrometers, recorders, recorder-controllers, smoke alarms, thermometers. Leeds & Northrup Co., Philadelphia, Pa.
Micromet—Water treatment. Calgon Inc., Pittsburgh, Pa.
MicroRold—Sheets. Washington Steel Corp., Washington, Pa.
Microstat—Thermostats. Friez Instrument Div., Bendix Aviation Corp. Baltimore, Md.
Microtherm—Thermostats. Barber-Colman Co., Rockford, Ill.
Microvac—Pumps. Stokes Machine Co., F. J., Philadelphia, Pa.
Microwax—Smoke alarms. Leeds & Northrup Co., Philadelphia, Pa.
Micro-Weld—Spot welders. Micro Products Co., Chicago, Ill.
Midget—Radiation. Utica Radiator Corp., Utica, N. Y.
Mighty Mite—Thermostats. Mechanical Industries Production Co., Akron, O.
Milford—Tools. Thompson & Son Co., The Henry G., New Haven, Conn.
Mills—Boilers. Smith Co., Inc., H. B., The, Westfield, Mass.
Milvaco—Air eliminators, floats, strainers, traps, valves. Milwaukee Valve Co., Milwaukee, Wis.
Milwaukee—Heaters. Blower Application Co., Milwaukee, Wis.
Minit Stoker—Water heaters. Catskill Metal Works, Inc., Catskill, N. Y.
Miracle Air—Window ventilator units. Reliable Sheet Metal Engineering Co., Chicago, Ill.
Miracle Red—Coatings. Debevoise Co., The, Brooklyn, N. Y.
Mir-O-Meter—Combustion control systems. Bowser, Inc., Fort Wayne, Ind.
Mirro-Matic—Heaters. Handley Brown Heater Co., Jackson, Mich.
Mirro-Shell—Heaters. Handley Brown Heater Co., Jackson, Mich.
Mixend—Electrodes. Arcos Corp., Philadelphia, Pa.
MKayO—Boilers. Mears-Kans-Ofeldt Inc., Philadelphia, Pa.
Mobilene—Gaskets. Johns-Manville, New York, N. Y.
Model Star—Valves. Powell Co., Wm., Cincinnati, O.
Moderator—Heating system. Warren Webster Co., Camden, N. J.
ModernAire—Fans, unit air conditioners. Dallas Engineering Co., Inc., Dallas, Tex.
Moduflow—Control systems. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modustat—Valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutrol—Heating systems. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutron—Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mogul—Packing. Johns-Manville, New York, N. Y.
Mogul—Boiler cleaning compounds and water treatment. North American Fibre Products Co., The, Cleveland, O.
Mohawk—Pipe. Cohoes Rolling Mill Co., Cohoes, N. Y.
Moisturator—Humidifiers. Bridgeport Brass Co., Bridgeport, Conn.
Moncrief—Sheet metal pipe and fittings. Henry Furnace Co., The, Medina, O.
Monel—Pipe fittings, pipe, sheets, tubing. International Nckel Co., Inc., The, New York, N. Y.
Monend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
Mongol—Pipe joint cement and compounds. Baer Bros., New York, N. Y.
Monmouth—Filters, humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.
Mono-Block—Insulation. Baldwin-Hill Co., Trenton, N. J.
Mono-Cast—Pipe. American Cast Iron Pipe Co., Birmingham, Ala.
Monoflo—Hot water heating systems and fittings. Bell & Gossett Co., Morton Grove, Ill.
Mono-Line—Refractories. Quigley Co., Inc., New York, N. Y.
Monovent—Ventilators. Burt Mfg. Co., Akron, O.
Monsoon—Heating and cooling surface. Ice Air Conditioning Co., New York, N. Y.
Monsoon—Fans, grilles, louvers. Jamieson Mfg. Co., Dallas, Texas.
Morflex—Flexible couplings. Morse Chain Co., Ithaca, N. Y.
Mortairset—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mortex—Protective coatings. Mortell Co., J. W., Kankakee, Ill.
Mortite—Caulking compounds, gaskets. Mortell Co., J. W., Kankakee, Ill.
Motoco—Gages, gage glasses, recorders, thermometers. Electric Auto-Lite Co., Instrument & Gauge Div., La Crosse, Wis.
Moto-Merco—Relays. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Motopump—Pumps. Yeomans Bros. Co., Chicago, Ill.
Motor—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.
MotoReducer—Speed reducers. Philadelphia Gear Works, Inc., Philadelphia, Pa.
Motorstoker—Stokers. Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Motosteel—Valves. Taylor Instrument Companies, Rochester, N. Y.
Mototurb—Ventilators. Uno Ventilator Co., Cliftondale, Mass.
Muffletone—Insulation. Celotex Corp., The, Chicago, Ill.
Mullitex—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mult-Au-Matic—Threading and boring machines. Bullard Co., The, Bridgeport, Conn.
Multiblade—Welding fume exhausters. General Blower Co., Chicago, Ill.
Multiclone—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Multi-Duty—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Multiduty—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Multifin—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Multiport—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Multiseal—Gaskets. Goetz Gasket & Packing Co., Inc., New Brunswick, N. J.
Multi-Seal—Bolts, repair plugs. Rolyan Metal Products, Chicago, Ill.
Multitherm—Air conditioning units. Clarage Fan Co., Kalamazoo, Mich.
Multi-V—V-belts. Goodrich Co., B. F., Akron, O.
Multi-V-Drive—Flagbelt drives. Worthington Pump & Machinery Corp., Harrison, N. J.
Multivane—Fans, blowers, unit heaters. B. F. Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Multi-Vent—Ceiling panels. Pyle-National Co., The, Chicago, Ill.
Multi-Wash—Dust collectors. Schneible Co., Claude B., Detroit, Mich.
Murco—Aftercoolers, cooling towers, heat exchangers, unit heaters. Murray Mfg. Co., D. J., Wausau, Wis.
Murex—Welding electrodes. Metal & Thermit Corp., New York, N. Y.
Murray—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

N-M-D—Valves. Lunkenheimer Co., Cincinnati, O.
N-R—Heat exchangers. National Radiator Co., The, Johnstown, Pa.
NYBCo Steelfin—Heating surface. New York Blower Co., Chicago, Ill.
Nalco—Boiler cleaning compounds, water treatment. National Aluminum Corp., Chicago, Ill.
National—Fans, furnaces, heaters. Magirl Foundry & Furnace Works, P. H., Bloomington, Ill.
National—Pumps. Austin-Mason Co., New York, N. Y.
National—Welders. Hollup Corp., Div. of National Cylinder Gas Co. Chicago, Ill.
Natur Temp—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.
Naturzone—Insulation. Wilson & Co., Inc., Chicago, Ill.
Nelson—Stokers. Heating Assurance, Inc., Spokane, Wash.
Nemo—Insulating cement. Smith & Kanzler Corp., Elizabeth, N. J.
New Cyclone—Dust collectors. Kirk & Blum Mfg. Co., Cincinnati, O.
Newarc—Welding electrodes. Electric Arc, Inc., Newark, N. J.
Niagara—Meters. Buffalo Meter Co., Buffalo, N. Y.
Nibco—Fittings, joints, valves. Northern Indiana Brass Co., Elkhart, Ind.
Nickelend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nickend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nicuend—Electrodes. Arcos Corp., Philadelphia, Pa.
No Drip—Insulation. J. W. Mortell Co., Kankakee, Ill.
Nohum—Valves. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
Non-clog—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Non-clog—Pipe line strainers. Boylston Steam Specialty Co., Chicago, Ill.
Non-Clogging—Spray nozzles. Link-Belt Co., Chicago, Ill.
Non-Con-Dux—Cement, insulation. Wilson, Inc., Grant, Chicago, Ill.
Non-Frost—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Non-Sweat—Insulation. Keasbey & Mattison Co., Ambler, Pa.
No-Ox-Id—Protective coatings. Dearborn Chemical Co., Chicago, Ill.
Norblo—Dust collectors, fans, washers. Northern Blower Co., Cleveland, O.
Nordstrom—Valves. Merco-Nordstrom Valve Co., Pittsburgh, Pa.
No-Rivet—Regulators, dampers. Ohio Products Co., Cleveland, O.
Northwestern—Water heaters. Coe Mfg. Co., Painesville, O.
Northwind—Unit air coolers. Pleasantaire Corp. of America, Washington, D. C.
Norwesco—Cement and compounds, boiler and radiator sealing compounds. Atlas Chemical Co., Marietta, O.
No Streak—Registers. Rock Island Register Co., Rock Island, Ill.

No-Vent—Pumps. Stout & Sons, David, St. Louis, Mo.
No-Ve-U—Door ventilators. Waterloo Register Sales Co., Waterloo, Ia.
Novoid—Insulation. Cork Import Corp., Suburban Englewood, N. J.
Novus—Boilers. National Radiator Co., The, Johnstown, Pa.
Nox-Odor—Odor adsorber. Tamms Silica Co., Chicago, Ill.
Nu-Air—Fans, window ventilator units. Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Nu-Air—Ventilators. Milcor Steel Co., Milwaukee, Wis.
Nu-Alpina—Ventilators. Milcor Steel Co., Milwaukee, Wis.
Nu-Grip—Shears and snips. Wiss and Sons Co., J., Newark, N. J.
Nu-Notch — Mushroom ventilators. Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Nuvent—Ventilators. Aeolus Dickinson, Chicago, Ill.
Nu-Wood—Insulation. Wood Conversion Co., St. Paul, Minn.

OB—Valves. Ohio Brass Co., Mansfield, O.
OC—Filters. American Air Filter Co., Louisville, Ky.
OCH—Filters. American Air Filter Co., Louisville, Ky.
O.E.F.—Preheaters, water heaters. Frank Heaters, Inc., Paterson, N. J.
OK—Motors. Marathon Electric Mfg. Corp., Wausau, Wis.
OK—Stock and dies. Greenfield Tap & Die Corp., Greenfield, Mass.
OPW—Valves. Ohio Pattern Works & Foundry Co., Cincinnati, O.
Oakwood—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Octupus—Welding fume collectors. Chelsea Products, Inc., Irvington, N. J.
Ofeldt — Boilers, superheaters. Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Oilbuster—Boiler cleaning compounds. Cannon Chemical Co., Inc., Everett, Mass.
Oil-O-Matic—Oil burners. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
Okay Tred—Leather belting. Houghton & Co., E. F., Philadelphia, Pa.
Ol' Faithful—Humidifiers. Maid-O'-Mist, Inc., Chicago, Ill.
One Venturi—Heating systems. Taco Heaters, Inc., New York, N. Y.
Orangeburg—Fiber pipe, conduit. Fibre Conduit Co., Orangeburg, N. Y.
Orliflex—Valves. Dunham Co., C. A., Chicago, Ill.
Oswego—Cutters, punches, wrenches. International Nutyp Tool Co., Oswego, N. Y.
Oxweld—Welding rod, welding and cutting apparatus. Linde Air Products Co., The, New York, N. Y.
Ozite—Insulation. American Hair & Felt Co., Chicago, Ill.

PC—Air conditioning units. Buffalo Forge Co., Buffalo, N. Y.
PDQC—Pipe machines. Bignall & Keeler Machine Works, Edwardsville, Ill.
P & H—Welding electrodes. Harnischfeger Corp., Milwaukee, Wis.
P & H—Arc Welders. Harnischfeger Corp., Milwaukee, Wis.
P. I. V. Gear—Speed changers. Link-Belt Co., Philadelphia, Pa.
Paintgrip—Sheets. American Rolling Mill Co., The, Middletown, O.
Palco—Packing. Greene, Tweed & Co., New York, N. Y.
Palco Wool-Saferized—Insulation. Pacific Lumber Co., The, San Francisco, Cailf.
Palmaire—Furnaces, unit heaters. Palmer Mfg. Corp., Phoenix, Ariz.
Palmetto—Packing, cement and compounds. Greene, Tweed & Co., New York, N. Y.
Palmetto Superheat—Gaskets and packing. Greene, Tweed & Co., New York, N. Y.
Par—Condensing units. Lynch Mfg. Corp., Toledo, O.
Paracoil—Coils, condensers, heaters, oil coolers, preheaters, steam traps, water chillers. Davis Engineering Corp., Elizabeth, N. J.
Paraline—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Parasol—Spray nozzles. Spraying Systems Co., Chicago, Ill.
Parko—Psychrometers. Parke-Cramer Co., Fitchburg, Mass.
Pathfinder—Belting. Goodyear Tire & Rubber Co., Akron, O.
Pax-Tite—Leather packing. Watson-Stillman Co., Roselle, N. J.
Pedrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Peer—Welders. Pier Equipment Mfg. Co., Benton Harbor, Mich.
Peerless—Humidifiers, air washers. New York Blower Co., Chicago, Ill.
Peerless—Pipe machines. Bignall & Keeler Machine Works. Edwardsville, Ill.
Peerless—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Penco—Plastic fittings, pipe. North Penn Co., New York, N. Y.
Penn-M-Co—Fittings. Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Perco-Flash—Water heaters. Kresno-Stamm Mfg. Co., New York, N. Y.
Perfection—Electrodes. Carlin Co., Anthony, Cleveland, O.
Perfection—Plates. Beaton & Cadwell Mfg. Co., New Britain, Conn.
Perfection—Valves. American District Steam Co., North Tonawanda, N. Y.
Permo-Aire—Filters. Air Devices, Inc., New York, N. Y.
Petco—Insulating cement, chambers. Peterson Co., B. A., Dowagiac, Mich.
Petro—Oil burners, water heaters. Petroleum Heat & Power Co., Stamford, Conn.
Pexto—Brakes, punches, shears, wrenches. Peck, Stow & Wilcox Co., Southington, Conn.
Pilot—Fans, motors. Smith Mfg. Co., Inc., F. A., Rochester, N. Y.
Pilot—Valves. Powell Co., Wm., Cincinnati, O.
Pioneer—Regulators, switches, thermostats. Master Electric Co., Aircraft & Electrical Controls Div., Dayton, O.
Pipe Master—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Pipemaster—Wrenches. Erie Tool Wks., Erie, Pa.
Pipetite—Cement and compounds. Lake Chemical Co., Chicago, Ill.
Pitco—Unions. Pittsburgh Valve & Fittings Corp., Barberton, O.
Pittsburgh—Radiator, unit heaters. Automatic Gas Equipment Co., Pittsburgh, Pa.
Pittsburgh-National—Meters. Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Planeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Plasgon—Cement and compounds. Samuel Cabot, Inc., Boston, Mass.
Plasti-Calk—Caulking compounds. Chamberlin Co. of America, Detroit, Mich.
Plastikon—Caulking compounds. Goodrich Co., B. F., Akron, O.
Plastiseal—Cement and Compounds. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Plastite—Caulking compounds. U. S. Stoneware Co., New York, N. Y.
Plastoid—Caulking compounds, furnace cement. Plastic Products Co., Detroit, Mich.
Playford—Stokers. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Plexifin—Unit heaters. Bayley Blower Co., Milwaukee, Wis.
Plexiform—Fans. Bayley Blower Co., Milwaukee, Wis.
Plicast—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Plisulate—Insulating cement and insulation. Plibrico Jointless Firebrick Co., Chicago, Ill.
Plisorite—Pipe. Bridgeport Brass Co., Bridgeport, Conn.
Plymouth—Stokers. Clizbe Bros. Mfg. Co., Plymouth, Ind.
Ply-Tech—Plywood sheets and board. Technical Ply-Woods, Chicago, Ill.
Pneumatronic—Electronic and pneumatic temperature control equipment. Johnson Service Co., Milwaukee, Wis.
Poeco—Insulation. Poe Co., C. W., Cleveland, O.
Polartron—Relays, regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Poro-Stone—Filters. Adams Co., Inc., R. P., Buffalo, N. Y.
Porto-Power—Pipe benders and pipe pushers. Blackhawk Mfg. Co., Milwaukee, Wis.
Porto-Shear—Shears. Van Dorn Electric Tool Co., Towson, Md.
Porto Shears—Shears. Black & Decker Mfg. Co., Towson, Md.
Portovent—Hose. American Ventilating Hose Co., New York, N. Y.
Pottstown—Pumps. Allen Billmyre Co., Mamaroneck, N. Y.
Power—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Power Boy—Pipe cutting and threading machines. Oster Mfg. Co., Cleveland, O.
Powerbilt—Fans. Power Engineering Co., Chicago, Ill.
Powerflex—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Power-Flex—Stokers. Link-Belt Co., Chicago, Ill.
Powermaster—Boilers. Orr & Sembower, Inc., Reading, Pa.
Precipitron—Air cleaners. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Premier—Boilers. National Radiator Co., The, Johnstown, Pa.
Premier—Welding rod. American Steel & Wire Co., United States Steel Corp. Subsidiary., Cleveland, O.
Pre-Notch—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Pressuretrol—Regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Prestal—Pipe benders. Tal Prestal Bender, Inc., Milwaukee, Wis.
Prestico—Caulking compounds, furnace cement. Presstite Engineering Co., St. Louis, Mo.
Prest-O-Lite—Leak detectors, torches. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Presto-Lock—Couplings. Drinkwater, Inc., Chicago, Ill.
Prest-O-Weld—Welding and cutting apparatus. Linde Air Products Co., The, New York, N. Y.
Princo—Anemometers, gages, hygrometers, manometers, psychrometers, regulators, relays, thermometers, thermostats. Precision Thermometer and Instrument Co., Philadelphia, Pa.
Probestos—Gasket. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Prop-R-Temp—Air conditioning units. Ice-Aire Conditioning Co., Inc., Brooklyn, N. Y.
Protectomotor—Air filters. Dollinger Corp., Rochester, N. Y.
Protectorelay—Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Protectoring—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Protex—Water treatment. Apex Engineering Co., Chicago, Ill.
Proxlin—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Pryzoak—Belting. Graton & Knight Co., Worcester, Mass.
Pul-Air—Ventilators. Lyon, Conklin & Co., Inc., Baltimore, Md.
Pul Air—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pul Air-Ridge—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pulling—Circulators, pumps. Columbus Steam Pump Works Co., Columbus, O.
Pulverzone—Stokers. American Coal Burner Co., Chicago, Ill.
Punkah—Louvers and shutters. Kelvin-White Co., Boston, Mass.
Pup—Valves. Fisher Governor Co., Marshalltown, Ia.
Puridryer—Dehumidifiers. Pritchard & Co., J. F. Equipment Div., Kansas City, Mo.
Purox—Electrodes, welding and cutting apparatus. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Pyralux—Enamels and lacquers. du Pont de Nemours & Co. (Inc.). E. I., Fabrics & Finishes Dept., Wilmington, Del.
Pyrex—Glass pipe, gage and sight glasses. Corning Glass Wks., Corning, N. Y.
Pyro—Thermometers, recorders, regulators. Pyrometer Instrument Co., New York, N. Y.
Pyroment—Cement. Keasbey & Mattison Co., Ambler, Pa.
Pyrotron—Recorders. Bailey Meter Co., Cleveland, O.

Q-Chromastic—Refractories. Quigley Co., Inc., New York, N. Y.
Q-Chrome—Refractories. Quigley Co., Inc., New York, N. Y.
QD—Sheaves. Worthington Pump & Machinery Corp., Harrison, N. J.
Q-Seal—Caulking compounds. Quigley Co., Inc., New York, N. Y.
Q-T—Insulation. Celotex Corp., The, Chicago, Ill.
QT—Unit heaters. Kisco Boiler & Engineering Co., St. Louis, Mo.
Quad—Cooling towers. Young Radiator Co., Racine, Wis.
Quad—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Quartzoid—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Quiet Zone—Blower wheels, fans. Palmer's Mfg. Corp., Phoenix, Ariz.

RBC—Roller bearings. Roller Bearing Co., of America, Trenton, N. J.
RB—Couplings. Link-Belt Co., Indianapolis, Ind.
RB Pressure — Pressure blowers, Western Blower Co., Seattle, Wash.
R & G—Grilles, registers. Register & Grille Mfg. Co., Brooklyn, N. Y.
R. I. 250—Unions. Rhode Island Fittings Co., Hillsgrove, R. I.
R-K—Combustion control systems, regulators, valves. Ruggles-Klingemann Mfg. Co., Salem, Mass.
R & M—Motors. Robbins & Myers, Inc., Springfield, O.
R-M—Packing. Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
R & M Moyno—Pumps, Robbins & Myers, Inc., Springfield, O.
R. P. & C.—Fittings, valves. Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
R-U-F—Fans. Reed Unit-Fans, Inc., New Orleans, La.
RX—Coatings. Watson-Standard Co., Pittsburgh, Pa.
Race—Fans, heaters. Royal Heaters, Inc., Alhambra, Calif.
Radiafin—Finned tubing. Schutte & Koerting Co., Philadelphia, Pa.
Radial—Unit heaters. McQuay, Inc., Minneapolis, Minn.

Radialflow—Valves, Smolensky Valve Co., Inc., Bedford, O.

Radiant—Direct radiation. Burnham Boiler Corp., Irvington, N. Y.

Radiatherm—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Radi-Ion—Ionization apparatus. Montgomery Bros., San Francisco, Calif.

Radi-Vector—Radiation. Vulcan Radiator Co., Hartford, Conn.

Radolite—Cement, refractories. Pyrolite Products Co., Cleveland, O.

Raintite—Ventilators. Aeolus Dickinson, Chicago, Ill.

Rajah—Packing. Johns-Manville, New York, N. Y.

Ramapo—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.

Ramix—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

Ranarex—Analyzers, indicators, recorders. Permutit Co., New York, N. Y.

Rapid—Oil coolers. Bell & Gossett Co., Morton Grove, Ill.

Rapiduction—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.

Rawl-Anchor—Bolts. Rawlplug Co., Inc., The, New York, N. Y.

Rawldrill—Drills for masonry. Rawlplug Co., Inc., The, New York, N. Y.

Rawl-Drive—Bolts. Rawlplug Co., Inc., The, New York, N. Y.

Rawl-Taper—Bolts. Rawlplug Co., Inc., The, New York, N. Y.

Raydiant—Radiation. Weil-McLean Co., Chicago, Ill.

Rayduct—Pipe, Bethlehem Steel Co., Bethlehem, Pa.

Reco—Accumulators, condensers, headers, heaters, preheaters, tanks, unit coolers. Richmond Engineering Co., Richmond, Va.

Reco—Controllers and starters, motors. Reynolds Electric Co., Chicago, Ill.

Reco Radi-Aire—Fans. Reynolds Electric Co., Chicago, Ill.

Record-O-Stat — Recorder-Controllers. Johnson Service Co., Milwaukee, Wis.

Recoy—Chillers, condensers, cooling surface, unit air conditioners and coolers. Refrigeration Economics Co., Inc., Canton, O.

Red—Operators, regulators, switches, valves. Cooper Co., Clark, Palmyra, N. J.

Red Devil—Furnace and pipe joint cement. Pecora Paint Co., Philadelphia, Pa.

Red Diamond—Pipe. American District Steam Co., North Tonawanda, N. Y.

Red Flash—Traps. Ellis Drier Co., Chicago, Ill.

Red Head—Tongs. Billings & Spencer Co., Hartford, Conn.

Red Head—Traps. Ellis Drier Co., Chicago, Ill.

Red Reading Mercury — Hygrometers, psychrometers, thermometers. Palmer Co., Cincinnati, O.

Red Seal—Engines. Continental Motors Corp., Muskegon, Mich.

Red Socket—Wrenches. Lowell Wrench Co., Worcester, Mass.

Red Top—Humidistats, thermostats. H-B Instrument Co., Philadelphia, Pa.

Red Top—Valves. Neptune Meter Co., New York, N. Y.

Red Top—Insulation. United States Gypsum Co., Chicago, Ill.

Redi—Stokers. General Machinery Co., Spokane, Wash.

Redi-Return—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.

Redi-Vac—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.

Reformend—Electrodes. Arcos Corp., Philadelphia, Pa.

Refrak Screen—Gas burners. Selas Corp. of America, Philadelphia, Pa.

Rego—Welding and cutting apparatus. Universal Power Corp., Cleveland, O.

Rego—Torches, welding and cutting aparatus. National Cylinder Gas Co., Chicago, Ill.

Relatrol—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.

Reliance—Regulators. American Meter Co., Inc., New York, N. Y.

Remote—Indicators. Yarnall-Waring Co., Philadelphia, Pa.

Renewo—Valves. Lunkenheimer Co., Cincinnati, O.

Renu-Vent—Air filters. American Air Filter Co., Inc., Louisville, Ky.

Research—Belting. Graton & Knight Co., Worcester, Mass.

Revolute—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.

Revolving—Heaters. Wing Mfg. Co., L. J., New York, N. Y.

Revolving—Ventilators. Burt Mfg. Co., Akron, O.

Rex—Chain drives, coal and ash conveyors, couplings, nozzles, pillow blocks, pumps. Chain Belt Co., Milwaukee, Wis.

Rex—Fans, ventilators, wheels. Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.

Rexarc—Electrodes, welders. Sight Feed Generator Co., Richmond, Ind.

Rex-Flex—Ducts. Chicago Metal Hose Corp., Maywood, Ill.

Rexoil—Burners, heaters. Reif-Rexoil, Inc., Buffalo, N. Y.

Rex-Tube—Duct connections. Chicago Metal Hose Corp., Maywood, Ill.

Rexvane—Fans. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.

Rex-Weld—Hose. Chicago Metal Hose Corp., Maywood, Ill.

Reyn-O-Cell—Insulation. Reynolds Metals Co., Richmond, Va.

Rhino—Caulking compounds. Pecora Paint Co., Philadelphia, Pa.

Richvar—Radiation. Richmond Radiator Co., Gas Products Div., New York, N. Y.

Rid-Al—Cleaning compounds, water treatment. Apex Engineering Co., Chicago, Ill.

Ridgid—Pipe machines, wrenches, cutters, vises. Ridge Tool Co., Elyria, O.

Rid - Sludge — Cleaning compounds, corrosion treatment. Apex All Weather Products, Chicago, Ill.

Rifco 300—Unions. Rhode Island Fittings Co., Hillsgrove, R. I.

Riflex—Vibration absorbers. United Metal Hose Co., Inc., Long Island City, N. Y.

Rihco—Humidifiers. Rhode Island Humidifier & Ventilating Co., Boston, Mass.

Rip-pl—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.

Ripple-Fin—Cooling and heating surface. Mequay, Inc., Minneapolis, Minn.

Robinson—Brakes, punches. New Albany Machine Mfg. Co., New Albany, Ind.

Rocan—Copper sheets. Revere Copper and Brass, Incorporated, New York, N. Y.

Rockwell—Blast gates. Thermix Engineering Co., Greenwich, Conn.

Rocop—Heaters. Rome-Turney Radiator Co., Rome, N. Y.

Rodpax—Packing. National Engineering Products, Inc., Washington, D. C.

Ro-Flo—Compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Rolagrip—Couplings. Gustin Bacon Mfg. Co., Kansas City, Mo.

Roman Bronze—Welding rod. Revere Copper and Brass Incorporated, New York, N. Y.

Roofvane—Ventilators. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.

Roof-Vent—Ventilators. Reed Unit-Fans, Inc., New Orleans, La.

Rotameter—Flow meters. Schutte & Koerting Co., Philadelphia, Pa.

Rota-Roll—Pumps. Sundstrand Machine Tool Co., Pump Div., Rockford, Ill.

Rotary—Ventilators. Swartwout Co., Cleveland, O.

Roto Blast—Furnaces. Moncrief Furnace Co., Atlanta, Ga.

Roto-Clone—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.

Rotojet—Spray nozzles. Binks Mfg. Co., Chicago, Ill.

Roto-louvre—Dryers. Link-Belt Co., Chicago, Ill.

Roto-Torq—Tools. Richmont, Inc., Los Angeles, Calif.

Roto-trol — Liquid pressure regulators and switches. Healy Ruff Co., St. Paul, Minn.

Ro-Twin—Air compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Roxaprene—Protective coatings. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.

Roxite—Pipe. United States Stoneware Co., New York, N. Y.

Roxyn C—Enamels and lacquers, protective coatings. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.

Royal Clipper—Cutters and shears. C-B Tool Co., Lancaster, Pa.

Rubalt—Enamels and lacquers. Hague & Co., Alfred, Brooklyn, N. Y.

Rubatex—Insulation. Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.

Rubyfluid—Solder. Ruby Chemical Co., Columbus, O.

Runwel—Packing. Greene, Tweed & Co., New York, N. Y.

Rusco—Insulation. Russell Co., F. C., The, Cleveland, O.

Rust Bloc No. 20—Coatings. Turco Products, Inc., Los Angeles, Calif.

Rust Erode—Coatings. Turco Products, Inc., Los Angeles, Calif.

Rust Raider—Compounds. Radiator Specialty Co., Charlotte, N. C.

Rust Veto—Protective Coatings. E. F. Houghton & Co., Philadelphia, Pa.

Rustbuster—Cleaning compounds. Cannon Chemical Co., Inc., Everett, Mass.

Rydlyme—Cleaning compounds. Apex Engineering Co., Chicago, Ill.

Rystrom—Pumps. Polo Pump Co., Polo, Ill.

S-A—Conveyors, feeders. Stephens-Adamson Mfg. Co., Aurora, Ill.

SA—Valves. Lunkenheimer Co., Cincinnati, O.

S. C.—Air heaters, gas burners. Surface Combustion Corp., Toledo, O.

S-N—Air conditioning units, burners, fans, heaters, pumps, stokers. Scott-Newcomb, Inc., St. Louis, Mo.

SOH—Boilers. Titusville Iron Works Co., Titusville, Pa.

S & P—Burners, governors, preheaters, regulators, strainers, valves. Staples & Pfeiffer, San Francisco, Calif.

S. R. P.—Protective coatings. Sonneborn Sons, Inc., L., New York, N. Y.

Saco—Speed reducers. Stephens-Adamson Mfg. Co., Aurora, Ill.

Saf-Dry—Refrigerants. Liquid Carbonic Corp., The, Chicago, Ill.

Saftrol—Controls. Penn Electric Switch Co., Goshen, Ind.

Saint Louis—Stokers. Ormsby-Osterman, Inc., St. Louis, Mo.

Safety—Heaters. Wing Mfg. Co., L. J., New York, N. Y.

Sal-Mo—Cement, insulation, packing. Sall Mountain Co., Chicago, Ill.

Sanidaire—Humidifiers. United States Air Conditioning Corp., Minneapolis, Minn.

Santocel—Insulation. Monsanto Chemical Co., Merimac Div., Everett, Mass.

Santosite—Water treatment. Monsanto Chemical Co., St. Louis, Mo.

Santrol—Registers. Tuttle & Bailey, Inc., New Britain, Conn.

Saran—Plastic pipe and tubing. Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.

Saunders—Pipe cutters. Erie Tool Works, Erie, Pa.

Saunders—Diaphragm valves. Grinnell Co., Inc., Providence, R. I.

Sauter—Time switches. Cramer Co., Inc., R. W., The, Centerbrook, Conn.

Schmidt—Torches. Minn-Kota Foundry & Mfg. Co., Fargo, N. D.

Schwan—Gas burners. Jamieson Mfg. Co., Dallas, Texas.

Scotch Giant—Refrigerating compressors. General Electric Co., Air Conditioning Dept., Bloomfield, N. J.

Scottie—Boilers. Kewanee Boiler Co., Kewanee, Ill.

Scroll-Pivoter—Shears. Wiss & Sons Co., J., Newark, N. J.

Scruin—Bolts. Star Expansion Bolt Co., New York, N. Y.

Scru-peller—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.

Sealdflow—Cooling towers. Pritchard & Co., J. F., Equipment Div., Kansas City Mo.

Seal Master—Bearings, Stephens-Adamson Mfg. Co., Aurora, Ill.

Sealeak—Compounds. Ampion Corp., Long Island City, N. Y.

Seal-Rite—Cement and compounds. Macksons Co., New York, N. Y.

Searchray—X-ray machines. North American Philips Co., Inc., New York, N. Y.

Security—Caulking compounds. National Mfg. Corp., Tonawanda, N. Y.

Segweld—Pipe fittings. Gustin Bacon Mfg. Co., Kansas City, Mo.

Seigelite—Gaskets. Johns-Manville, New York, N. Y.

Seismo-Dampers—Bases. Korfund Co., Inc., Long Island City, N. Y.

Selectair—Air conditioning units. Johnson Co., S. T., Oakland, Calif.

Selectrol—Regulators. Automatic Control Co., St. Paul, Minn.

Sells—Bearings. Royersford Foundry & Machine Co., Royersford, Pa.

Sensatherm—Thermostats. Mercoid Corp., Chicago, Ill.

Sensitrol—Relays. Weston Electrical Instrument Corp., Newark, N. J.

Serrabestos—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.

Service—Packing. Johns-Manville, New York, N. Y.

Servicecoat—Enamels and lacquers. Debevoise Co., The, Brooklyn, N. Y.

Serviron—Coatings. Saverite Engineering Co., Hoboken, N. J.

Sesure—Gages. Yarnall-Waring Co., Philadelphia, Pa.

"77"—Pipe coverings. Eagle-Picher Co., Cincinnati, O.

Shawco—Bends, headers. Shaw Co., Benjamin F., Wilmington, Del.

Sheetrock—Sheets and board for ducts. United States Gypsum Co., Chicago, Ill.

Shelby — Tubing. National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.

Shield-Arc—Electrodes, arc welders. Lincoln Electric Co., Cleveland, O.

Shone—Sewage ejectors. Yeomans Bros. Co., Chicago, Ill.

Shuntflo—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.

Shut-O-Vent—Louvers and shutters. Reed Unit-Fans, Inc., New Orleans, La.

Sierra-Air—Air conditioning units. International Sales Co., San Francisco, Calif.
Silastic — Compounds, packing. Dow Corning Corp., Midland, Mich.
Silent Air—Fans. Belanger Fan & Blower Co., Detroit, Mich.
Silentaire — Window ventilator units. Berger Mfg. Div., Republic Steel Corp., Canton, O.
Silent-Auburn—Burners, heaters, air conditioning units. Auburn Burner Co., Auburn, Ind.
Silentblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Silent-Breeze—Propeller fans. Holcomb & Hoke Mfg. Co., Indianapolis, Ind.
Silentvane—Fans. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Sil-Fos—Solder. Handy & Harman, New York, N. Y.
Silicair—Insulation. Western Silicair Products, Inc., Burbank, Calif.
Silverlink—Chain drives. Link-Belt Co., Indianapolis, Ind.
Silver Magic—Welding compounds. Universal Power Corp., Cleveland, O.
Silverseal—Packing. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Silverstreak—Chain drive. Link-Belt Co., Indianapolis, Ind.
Silver Stream—Spray nozzles. Skinner Irrigation Co., Troy, O.
Silvertop—Eliminators, traps. Anderson Co., V. D., The, Cleveland, O.
Simplex—Gages. Viking Pump Co., Cedar Falls, Ia.
Simplex—Pipe vises. Desmond-Stephan Mfg. Co., Urbana, O.
Simplex—Regulators, tanks. Bell & Gossett Co., Morton Grove, Ill.
Sim-Trol—Controls. Simplex Mfg. Co., Fond du Lac, Wis.
Sioux—Electric drills. Albertson & Co., Inc., Sioux City, Ia.
Sirocco—Blowers. American Blower Corp., Detroit, Mich.
695 Plastic—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
SkilDrill—Drills. Skilsaw, Inc., Chicago, Ill.
SkilShear—Shears. Skilsaw, Inc., Chicago, Ill.
Skip-Tooth—Dies. Nye Tool & Machine Co., Chicago, Ill.
Slo-Speed—Reducers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Slugin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Smith-Dolan—Electric preheaters and stress relievers. Electric Arc., Inc., Newark, N. J.
Smith-Mills—Boilers. Smith Co., Inc., H. B., Westfield, Mass.
Smokotrol—Smoke alarms. Power Engineering Co., Chicago, Ill.
Snap-Rite—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Sno-Breeze—Air conditioning units, cooling surface. Palmer Mfg. Corp., Phoenix, Ariz.
Snug—Radiation. Weil-McLain Co., Chicago, Ill.
Softweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Solray—Radiation. Weil-McLain Co., Chicago, Ill.
Sol-vet—Cleaning compounds, water treatment. Anderson-Stoltz Corp., Kansas City, Mo.
Sono-O-Seal—Insulation. General Insulating Products Co., Brooklyn, N. Y.
So-Salts—Solder. Turco Products, Inc., Los Angeles, Calif.
Soundliner—Insulation. Baldwin-Hill Co., Trenton, N. J.
Sovereign—Packing. Darcoid Co., Inc., New York, N. Y.
Spatter Nox—Welding compounds. Universal Power Corp., Cleveland, O.
Spatter Off—Welding compounds. Universal Power Corp., Cleveland, O.
Spartan—Packing. Graton & Knight Co., Worcester, Mass.
Spekaluminite — Coatings. Special Chemicals Corp., New York, N. Y.
Special X—Solder. Industrial Service Laboratories, Milwaukee, Wis.
Spee-Dee—Blue print and white print machines. Peck & Harvey, Chicago, Ill.
Speed Clamps—Hose clamps. Tinnerman Products, Inc., Cleveland, O.
Speed-Flex—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Speed Heater—Unit heaters. Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Speed-Jack—Changers. The American Pulley Co., Philadelphia, Pa.
Speed Nuts—Locknuts. Tinnerman Products, Inc., Cleveland, O.
Speed-Trol—Changers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Speed Prime—Pumps. Chain Belt Co., Milwaukee, Wis.
Speedarc—Electrodes. Universal Power Corp., Cleveland, O.
Speedweld—Electrodes. Trindl Products, Ltd., Chicago, Ill.
Speedylectric—Boilers. Livingstone & Co., Boston, Mass.
Sphero—Blow-off valves. Fairbanks Co., New York, N. Y.
Spider-Web—Air filters. Wilson & Co. Inc., Chicago, Ill.
Spiradome—Spray nozzles. Fluor Corp., Ltd., The, Los Angeles, Calif.
Spiralok—Pulleys and sheaves. Scientiae Tool Co., Dayton, Ohio.
Spiralwound—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Spiratube—Ducts and duct fittings, hose. Warner Bros. Co., Spiratube Div., Bridgeport, Conn.
Spirawelded—Pipes. Naylor Pipe Co., Chicago, Ill.
Spiro—Heaters. Stout & Sons, David, St. Louis, Mo.
Spirodome—Spray nozzles. Cooling Tower Co., Inc., The, Div. of the Fluor Corp., Ltd., New York, N. Y.
Spirotallic—Gaskets. Johns-Manville, New York, N. Y.
Spirovane—Fans. Western Blower Co., Seattle, Wash.
Spraco—Booths, nozzles, separators, strainers, washers. Spray Engineering Co., Somerville, Mass.
Spra-Rite—Nozzles. Binks Mfg. Co., Chicago, Ill.
Spray-Acoustic—Insulation. Sprayo Flake Co., Chicago, Ill.
Sprayit—Booths, compressors, pumps, regulators. Electric Sprayit Co., The, Sheboygan, Wis.
Stabilflo—Valves. Foxboro Co., Foxboro, Mass.
Stacon—Regulators, valves. Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Sta-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Staidarc—Electrodes. Universal Power Corp., Cleveland, O.
Stainarc—Electrodes. Universal Power Corp., Cleveland, O.
Stainlend—Electrodes. Arcos Corp., Philadelphia, Pa.
Stainless—Cement and compounds. Grinnell Co., Inc., Providence, R. I.
Stainweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Standard—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Standard—Ventilators. Burt Mfg. Co., Akron, O.
Standforated—Grilles. Standard Stamping & Perforating Co., Chicago, Ill.
Star—Ventilators. Merchant & Evans Co., Philadelphia, Pa.
Starbird—Pressure and vacuum switches. Meletron Corp., Los Angeles, Calif.
Statick—Ventilators. Hirschman-Pohle Co., Inc., Le Roy, N. Y.
Staxauster—Roof ventilators. Allen Corp., Detroit, Mich.
Staynew—Filters. Dollinger Corp., Rochester, N. Y.
Stazin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Steelok—Packing. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Sterilamp—Lamps. Westinghouse Electric & Mfg. Co., Bloomfield, N. J.
Sterlco—Controls, eliminators, pumps, strainers, heating systems, regulators, traps, valves. Sterling, Inc., Milwaukee, Wis.
Sterling—Compressors, condensers, valves. Reynolds Mfg. Co., Inc., Springfield, Mo.
Stictite—Cement. Refractory & Insulation Corp., New York, N. Y.
Stillson—Pipe wrenches. Erie Tool Works, Erie, Pa.
Stilphen—Fans. Howry-Berg Steel & Iron Works, Denver, Colo.
Stokerator—Stokers. Northern Steel & Stoker Corp., Peoria, Ill.
Stokerelay—Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Streamaire—Unit heaters, radiation, cooling surface. Young Radiator Co., Racine, Wis.
Steamjet—Spray nozzles. Spraying Systems Co., Chicago, Ill.
Strahman—Boiler gage cocks. Klingerit Inc., New York, N. Y.
Streamline—Couplings, cutters, fittings, heat exchangers, manifolds, nipples, pipe, strainers, tubing, unions, valves. Mueller Brass Co., Port Huron, Mich.
Stronghold—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Stud-Pak—Insulation. United States Mineral Wool Co., Chicago, Ill.
Sturdybender—Power brakes. Bath Co., Cyril, The, Cleveland, O.
Submersion—Boilers, water heaters. Stout & Sons, David, St. Louis, Mo.
Sullarc—Electrodes. Universal Power Corp., Cleveland, O.
Sunrad—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Super—Insulating cement. Union Asbestos & Rubber Co., Cicero, Ill.
Super Air Screws—Fans. Marathon Electric Mfg. Corp., Wausau, Wis.
Super Seal—Fittings. Grinnell Co., Inc., Providence, R. I.
Super "66"—Insulation. Eagle-Picher Co., Cincinnati, O.
Super 7—V belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Super Silvertop—Traps. Anderson Co., V. D., The, Cleveland, O.
Super Thermo Stucco—Cement. Chicago Fire Brick Co., Chicago, Ill.
Super X—Sheets. Western Brass Div. of Olin Industries, Inc., East Alton, Ill.
Super X—Coatings. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Supercord—V belts, Browning Mfg. Co., Inc., Maysville, Ky.
Supercutno—Packing. Greene, Tweed & Co., New York, N. Y.
Super-deLavaud—Pipe. U. S. Pipe & Foundry Co., Burlington, N. J.
Superector—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superex—Insulation. Johns-Manville, New York, N. Y.
Super-Fan—Fan blades. Norwin Co., Freeport, Ill.
Superflex—Drives. Gates Rubber Co., The, Denver, Colo.
Superflux—Solder. Lewis Laboratories, Inc., Paul, Milwaukee, Wis.
Superheat—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Superior—Fans. American Foundry & Furnace Co., Bloomington, Ill.
Superior—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superjustable—Adjustable wrenches. Williams & Co., J. H., Buffalo, N. Y.
Super-Power—Drives. Baldwin Belting, Inc., New York, N. Y.
Superratchet—Ratchet Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superrench—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Super-S—Gages. Klingerit, Inc., New York, N. Y.
Supersocket—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Supertan—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Supertemp—Insulation. Eagle-Picher Co., Cincinnati, O.
Sure Return—Condensation return pumps. Chicago Pump Co., Chicago, Ill.
Surevent—Valves. Gorton Heating Corp., Cranford, N. J.
Sureweld—Electrodes. Hollup Corp., Div. of National Cylinder Gas Co., Chicago, Ill.
Swendeman—Air separators. Leavitt Machine Co., Orange, Mass.
Sylphon—Bellows, joints, operators, regulators, valves. Fulton Sylphon Co., Knoxville, Tenn.
Synchro—Valves. The Bristol Co., Waterbury, Conn.
Synchro-Lectric—Viscosimeters. Brookfield Engineering Laboratories, Sharon, Mass.
Synchro-Meter—Meters. Bailey Meter Co., Cleveland, O.
Synchron—Motors. Hansen Mfg. Co., Inc., Princeton, Ind.
Synchrotie—Recorders. Westinghouse Electric Corp., East Pittsburgh, Pa.
Syncretizer—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Syncrogear—Speed reducers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Syndolag—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Syphonaire—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

T.T.—Smoke guns. Hill, E. Vernon, Chicago, Ill.
Tabasco—Water heaters. Kewanee Boiler Corp., Kewanee, Ill.
Tag—Humidistats, hygrometers, manometers, meters, psychrometers, recorders, regulators, thermometers, valves. Tagliabue Div., C. J. Portable Products Corp., Brooklyn, N. Y.
Tampico—Air filters. Chicago Filter Co., Joliet, Ill.
Tampin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Tank-O-Meter—Gages, indicator-controllers, indicators. Uehling Instrument Co., Paterson, N. J.
Tanktrol—Regulators. Automatic Control Co., St. Paul, Minn.
Tannate—Belting, packing. Rhoads & Sons, J. E., Philadelphia, Pa.
Tannate-Rockwood—Belt drives. Rhoads & Sons, J. E., Philadelphia, Pa.
Tanseal—Packing. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Techni-Louvre—Vanes. Waterloo Register Sales Co., Waterloo, Ia.
Teksag Colloid—Boiler compounds. American Teksag Products Co., Inc., Mount Vernon, N. Y.
Telemaster—Relays. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Televisor—Gages. Schutte & Koerting Co., Philadelphia, Pa.
Tellevel—Indicators, switches. Stephens-Adamson Mfg. Co., Aurora, Ill.

Teltru—Anemometers, gages. Hill, E. Vernon, Chicago, Ill.
Tem-Clock (Electric)—Time switches. Penn Electric Switch Co., Goshen, Ind.
Temperator—Unit air conditioners. Dunham Co., C. A., Chicago, Ill.
Tempryte—Windows. Truscon Steel Co., Youngstown, O.
Temptrol—Insulation. Badham Insulation Co., Inc., Birmingham, Ala.
Tempscribe—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Temtrol—Thermostats. Penn Electric Switch Co., Goshen, Ind.
Tensulate—Cement, insulation. Tennessee Products Corp., Nashville, Tenn.
Texrope—V-belt drives, pulleys, v-belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texslide—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texsteel—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Textolite—Insulation, tubing. General Electric Co., Chemical Dept., Pittsfield, Mass.
Tharco—Cement. The Armstrong Co., Detroit, Mich.
Thawzone—Dehydrant and acid neutralizer. Highside Chemicals Co., Newark, N. J.
Therhumiter—Thermometers. Weksler Thermometer Corp., New York, N. Y.
Thermalfin—Unit coolers. Thermal Co., Inc., Milwaukee, Wis.
Thermafuel—Furnaces. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermascrete—Refractories. Munnn and Steele, Inc., Newark. N. J.
Therm-Cote—Radiation. Extended Surface, Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Thermek—Heating and cooling surface. Peerless of America, Inc., Chicago, Ill.
Thermidaire—Burners, furnaces, heaters. Campbell Heating Co., E. K., Kansas City, Mo.
Thermix—Dust collectors. Prat-Daniel Corp., Port Chester, N. Y.
Thermo—Expansion valves. Alco Valve Co., St. Louis, Mo.
Thermo—Heaters. American Furnace Co., St. Louis, Mo.
Thermochek—Controls. Bell & Gossett Co., Morton Grove, Ill.
Thermo-Draulic—Operators, regulators. Perfex Corp., Milwaukee, Wis.
Thermodrive — Speedchangers, pulleys and sheaves. Webster Electric Co., Racine, Wis.
Thermoflex—Strainers, heating systems, radiator orifices, traps, valves. Cashin Co., W. D., Boston, Mass.
Thermoflo—Valves. Bell & Gossett Co., Morton Grove, Ill.
Thermo-Flow—Heat exchangers. Thermal Industries, Indio, Calif.
Thermogage—Thermometers. Hotstream Heater Co., Cleveland, O.
Thermogas—Furnaces, unit heaters. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermo Grip—Torches. Ideal Industries, Inc., Sycamore, Ill.
Thermoguide—Thermometers. Taylor Instrument Companies, Rochester, N. Y.
Thermo-Humidigraph — Recorder-controllers. Bristol Co., The, Waterbury, Conn.
Thermoil—Furnaces, unit heaters. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermolator—Valves. Triplex Heating Specialty Co., Inc., Peru, Ind.
Thermolier—Unit heaters. Grinnell Co., Inc., Providence, R. I.
Thermopane — Windows. Libbey-Owens-Ford Glass Co., Toledo, O.
Therm-o-tile—Conduit. Porter & Co., Inc., H. W., Newark, N. J.
Thermotrol—Valves. Sterling Engineering Co., Milwaukee, Wis.
Thermovent—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Thermovoir—Water heaters. Bell & Gossett Co., Morton Grove, Ill.
Thin Man—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Thor—Belting. Goodyear Tire & Rubber Co., Akron, O.
Thor—Drills, pumps, reamers, shears. Independent Pneumatic Tool Co., Chicago, Ill.
Thorobred—V belts and v belt drives. Dayton Rubber Mfg. Co., Dayton, O.
Thredolets—Fittings. Bonney Forge & Tool Wks., Allentown, Pa.
3C—Motor controls. Clark controller Co., Cleveland, O.
Thrift—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Throway—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Thur-Ma-Lox—Coatings. Dampney Co. of America, Hyde Park, Boston, Mass.
Ticotherm—Boilers. Titusville Iron Works Co., Titusville, Pa.
Tilco-Fin—Heating and cooling surface. Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Tilt Trap—Steam traps. Nason Co., Detroit, Mich.
Time Saver—Damper regulators. Goese Mfg. Co., Milwaukee, Wis.
Timercoid—Time switches. Mercoid Corp., Chicago, Ill.
Timerelay—Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Timetrol (Manual)—Time switches. Penn Electric Switch Co., Goshen, Ind.
Tin-Ezy—Coatings, solder and fluxes. Johnson Co., Lloyd S., Chicago, Ill.
Tin-Loy—Solder. Eagle-Picher Co., Cincinnati, O.
Tiny—Traps. Nason Co., Detroit, Mich.
Titan—Traps. Nason Co., Detroit, Mich.
Tite—Caulking compounds. Krehbiel Co., J. H., Chicago, Ill.
Tite Seal—Cement and compounds. Radiator Specialty Co., Charlotte, N. C.
Tom Thumb—Pipe machines. Oster Mfg. Co., Cleveland, O.
Toncan—Pipe, sheets. Republic Steel Corp., Cleveland, O.
Toolarc—Electrodes. Universal Power Corp., Cleveland, O.
Toolweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Torkflash—Wrenches. Blackhawk Mfg. Co., Milwaukee, Wis.
Torpedo—Dehydrators, filters. Imperial Brass Mfg. Co., Chicago, Ill.
Torqometer—Torque indicating wrenches. Snap-On Tools Corp., Kenosha, Wis.
Torq-Stop—Wrenches. Richmont, Inc., Los Angeles, Calif.
Trace—Refrigerant leak detectors. Highside Chemicals Co., Newark, N. J.
Transaxil—Flame failure controls. Mettler Co., Lee B., Los Angeles, Calif.
Transflex—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Transite—Conduit, pipe, refractories, sheets and board. Johns-Mansville, New York, N. Y.
Transparent—Analyzers, gages, manometers. Dwyer Mfg. Co., F. W., Chicago, Ill.
Trap-Dri—Dehydrators. Automatic Products Co., Milwaukee, Wis.
Trap-it—Filters. Automatic Products Co., Milwaukee, Wis.
Trap Nest—Insulation. Wilson, Inc., Grant, Chicago, Ill.
Tray—Cooling towers, condensers. New England Cooling Tower Co., Boston, Mass.
Treet-O-Control—Steam system and water treatment. % Proportioneers, Inc. %, Providence, R. I.
Treet-O-Unit—Feeders, pumps. % Proportioneers, Inc. %, Providence, R. I.
Triad—Stocks and dies. Nye Tool & Machine Co., Chicago, Ill.
Tri-Clad—Motors. General Electric Co., Apparatus Dept., Schenectady, N. Y.
Trident—Meters. Neptune Meter Co., New York, N. Y.
Tri-Flex—Registers, grilles. Tuttle & Bailey, Inc., New Britain, Conn.
Tri-Flux—Solder. Wolfe-Kote Co., Sheboygan, Wis.
Trimo—Cutters, tongs, vises, wrenches. Trimount Mfg. Co., Boston, Mass.
Trimo—Cutters. Erie Toolworks, Erie, Pa.
Trimtherm—Thermostats. General Controls Co., Glendale, Calif.
Triple-A—Enamels and lacquers, protective coatings. Quigley Co., Inc., New York, N. Y.
Triple Duty—Heating systems. Bell & Gossett Co., Morton Grove, Ill.
Triple-Seal—Fittings. Imperial Brass Mfg. Co., Chicago, Ill.
Triplex—Stocks and dies. Nye Tool & Machine Co., Chicago, Ill.
Tripl-Mix—Cement. Krehbiel Co., J. H., Chicago, Ill.
Tri-Rotor—Pumps. Yale & Towne Mfg. Co., Stamford, Conn.
Tri-Sli—Dampers. Tuttle & Bailey, Inc., New Britain, Conn.
Tri-trol—Regulators, switches, thermostats. Marsh Heating Equipment Co., Chicago, Ill.
Triumph—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
Triumph—Liquid level gages and indicators. Boston Auto Gage Co., Pittsfield, Mass.
Trojan—Boilers. Burnham Boiler Corp., Irvington, N. Y.
Trojan—Stokers. Auburn Burner Co., Auburn, Ind.
Tropelite—Coatings. Tropical Paint & Oil Co., Cleveland, O.
Tropic-Breeze—Air conditioning units. Dalzen Tool & Mfg. Co., Detroit, Mich.
Truflex—Bi-metals. General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Truliradiant—Gas burners. Sullivan Valve & Engineering Co., Butte, Mont.
Trumark—Protractor for marking pipe. Tru-Line Corp., Los Angeles, Calif.
Try-Me—Regulators, strainers, valves. Tryco Products, Inc., Westfield, Mass.
Tubejet—Compressors, ejector type vacuum pump. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Tube-Loy—Lead alloy tubing. Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Tube Master—Flaring tools. Leonard Precision Products Co., Garden Grove, Calif.
Tuf-flex—Gage and sight glasses. Libbey-Owens-Ford Glass Co., Toledo, O.
Tuf-On—Protective coatings. Wipe-On Corp., Brooklyn, N. Y.
Tulox—Plastic pipe and tubing. Extruded Plastics, Inc., Norwalk, Conn.
Turbo—Air washers, spray nozzles. Bayley Blower Co., Milwaukee, Wis.
Turbo Vane—Fans and blowers. B. F. Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Turbulaire — Dryers. Western Precipitation Corp., Los Angeles, Calif.
Turret—Pumps. Yeomans Bros. Co., Chicago, Ill.
Tuway—Strainers. Wright-Austin Co., Detroit, Mich.
20th Century—Bearings. Roller Bearing Co., of America, Trenton, N. J.
Twin Contact—Controls. Perfex Corp., Milwaukee, Wis.
Twin G-Fin—Preheaters. Griscom-Russell Co., The, New York, N. Y.
Twin Seal—Check valves, gage testers. Mansfield & Green, Cleveland, O.
Twindow—Heat insulating windows. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Two Way—Dampers. Tuttle & Bailey, Inc., New Britain, Conn.
Tygon—Protective coatings, plastic tubing. U. S. Stoneware Co., New York, N. Y.
Tylox—Pipe couplings. United States Stoneware Co., New York, N. Y.
Tymit—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Tymotherm—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Typhoon—Chillers, coils, condensers, coolers, fans, air conditioning units, air washers. Ice Air Conditioning Co., New York, N. Y.
Tytecote—Insulation. Specialty Converters, Inc., East Braintree, Mass.

U. P. S.—Clamps. Grinnell Co., Inc., Providence, R. I.
U. S.—Valves. Powell Co., Wm., Cincinnati, O.
U. S. S.—Angles, sheets. Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
U-S-S—Shapes, sheets. Columbia Steel Co., San Francisco, Calif.
USS—Sheets, structural shapes. Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
U. S. Airco—Air conditioning equipment, blowers, condensers. United States Air Conditioning Corp., Minneapolis, Minn.
UTA—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Ugasco—Gaskets. United States Gasket Co., Camden, N. J.
U-Loy—Sheets. Republic Steel Corp., Cleveland, O.
Unaflo—Steam engines. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Unamatic—Automatic arc welding equipment. Una Welding, Inc., Cleveland, O.
Unarco—Insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Unibestos—Insulation. Union Asbestos & Rubber Co. Cicero, Ill.
Unicoils—Air conditioning unit. Clarage Fan Co., Kalamazoo, Mich.
Uniduct—Ducts and duct fittings. General Corporation, Minneapolis, Minn.
Uni-fin—Grilles, registers. Barber-Colman Co., Rockford, Ill.
Uni-fin—Air diffusers dampers, grilles. Barber-Colman Co., Rockford, Ill.
Union—Valves. Powell Co. Wm., Cincinnati, O.
Unipack—Welding fume exhausters, centrifugal fans. American Machine Products Co., Marshalltown, Ia.
Uniplastic—Furnace and insulating cement, insulation. Robinson Insulation Co., Great Falls, Mont.
Unisheare—Electric shears. Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Unisorb—Bases and pads, insulation. Felters Company, The Boston, Mass.
Unitaire—Air conditioning units. B. F. Sturtevant Co., Div. of Westinghouse Electric, Hyde Park, Boston, Mass.
Unitem—Heaters. Bell & Gossett Co., Morton Grove, Ill.
Unitherm—Unit heaters and coolers. Clarage Fan Co., Kalamazoo, Mich.
Unitrol—Regulators, switches, thermostats. Marsh Tritrol Co. Chicago, Ill.
Unitrol—Valves. Kieley, Mueller, Inc., North Bergen, N. J.
Universal—Benders. Hossfeld Mfg. Co., Winona, Minn.
Universal—Burners. Dalzen Tool & Mfg. Co., Detroit, Mich.
Universal—Cast iron pipe. Central Foundry Co., New York, N. Y.
Universal—Centrifugal pumps. Bell & Gossett Co., Morton Grove, Ill.

Universal—Gas and oil burners. Mettler Co., Lee B., Los Angles, Calif.
Universal—Packing. Johns-Manville New York, N. Y.
Universal—Pipe cutters. Nye Tool & Machine Co., Chicago, Ill.
Universal—Regulators. Dockson Corp., Detroit, Mich.
Universal Unaflow—Engines. Skinner Engine Co., Erie, Pa.
Upson—Bolts and studs. Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Utility—Compressors. Schramm, Inc. West Chester, Pa.
Utility—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Utilius—Fans. Hirschman-Pohle Co., Inc., LeRoy, N. Y.

Vac-Airid—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Vacu-Draft—Blowers. Muncie Gear Wks., Inc., Muncie Ind.
Vacuumstat—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Valcalox—Damper regulators. Young Regulator Co., Cleveland, O.
Valpit—Unions. Pittsburgh Valve & Fittings Corp., Barberton, O.
Valdura—Caulking compound. American-Marietta Co., Chicago, Ill.
Valvactor—Valve operators. Foxboro Co., Foxboro, Mass.
Vaporene—Corrosion inhibition. Metropolitan Refining Co., Inc., Long Island City N. Y.
Vaporstat — Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Varidrive—Speed changers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Varipitch—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Vari-Pitch—Speed changers, pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Variport—Valves. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Vari-Vent—Air and vacuum valves. Dole Valve Co., Chicago, Ill.
Vee Jet—Spray nozzles. Spraying Systems Co., Chicago, Ill.
Veelos—V-belts. Manheim Mfg. & Belting Co., Manheim, Pa.
Velometer—Air velocity meters, anemometers. Illinois Testing Laboratories, Inc., Chicago, Ill.
Velvet—Cement. Keasbey & Mattison Co., Ambler Pa.
Venko—Boilers. Waterfilm Boiler, Inc., Jersey City, N. J.
Vent-Vac—Heating systems. Anderson Products, Inc., Cambridge, Mass.
Vento—Traps. Haines & Co., William S., Philadelphia, Pa.
Vent-Rite—Air valves. Anderson Products, Inc., Cambridge, Mass.
Ventube—E. I. du Pont de Nemours & Co. Inc., Fabrics & Finishes Dept., Wilmington, Del.
Ventura—Fans. American Blower Corp., Detroit, Mich.
Venturafin—Unit heaters. American Blower Corp. Detroit, Mich.
Venturi—Fan housings. Commercial Shearing & Stamping Co., Youngstown, O.
Venturi—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Venturi-Flo—Air diffusers. Barber-Colman Co., Rockford Ill.
Verco—Insulating cement. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vercoustic—Insulation. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vermiculite—Insulation. International Vermiculite Co., Girard, Ill.
Vernier-Set—Time switches. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Versalend—Arc welding electrodes. Arcos Corp., Philadelphia Pa.
Versa-Tool—Electric drills. York Electric & Machine Co., York, Pa.
Vertiflow—Unit heaters. Young Radiator Co., Racine, Wis.
Vertivent—Ventilators. Young Radiator Co., Racine, Wis.
Vescote—Coatings. Vesco Corp., New York, N. Y.
V-Flat—Pulleys and sheaves. Dayton Rubber Mfg. Co. Dayton, O.
Vibrasorber—Vibration absorbers. Chicago Metal Hose Corp., Maywood, Ill.
Vibro-Bar—Bases and pads. Korfund Co., Inc. Long Island City, N. Y.
Vibro-Dampers—Bases. Korfund Co., Long Island City, N. Y.
Vibro Insulators—Bases. Goodrich Co., B. F., Akron, O.
Virbo-Isolator—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Vibro-pad—Bases and pads. Viking Air Conditioning Corp., Cleveland, O.
Victory—Registers. Register & Grille Mfg. Co. Inc., Brooklyn, N. Y.
Victron—Electric motors, louvers and shutters, propeller fan blades and fans. Victor Electric Products, Inc., Cincinnati, O.
Vim—Gaskets, leather packing. Houghton & Co., E. F., Philadelphia, Pa.
Vim Tred—Leather belting. Houghton & Co., E. F. Philadelphia, Pa.
Visaflame—Controls. Mercoid Co., The, Chicago, Ill.
Visoleak—Detectors. Western Thermal Equipment Co., Los Angeles, Calif.
Vistand—Vise stands. Armstrong Mfg. Co., Bridgeport, Conn.
Vitalaire—Air conditioning units. Ice Cooling Appliance Corp., Morrison, Ill.
Vitalloy—Wrenches. Billings & Spencer Co., Hartford, Conn.
Vitra-Carlite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn N. Y.
Vitriram—Furnace cement. U. S. Stoneware Co., New York, N. Y.
Vix-Syn—Rubber and synthetic packing. Houghton & Co., E. F., Philadelphia, Pa.
V-Meth-L—Refrigerant. Virginia Smelting Co., West Norfolk, Va.
Voladjuster — Dampers. Barber-Colman Co., Rockford, Ill.
Volcano—Ventilators. Iwan Brothers, South Bend, Ind.
Volocitrol—Louvers, regulators. Barber-Colman Co., Rockford, Ill.
Vornadofan—Fans. Sutton Corp., O. A., Beacon Bldg., Wichita, Kan.
Vortex—Pumps. Lawrence Pump & Engine Co., Lawrence, Mass.
Vortex—Nozzles. Phillips Cooling Tower Co., Inc., New York, N. Y.
V-tite—Gaskets. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.
V-to-V—Pulleys and sheaves. Dayton Rubber Mfg. Co., Dayton, O.
Vulcalock—Fittings, pipe, tanks, valves. Goodrich Co., B. F., Akron, O.
Vulcan—Stands, tongs, vises. Williams & Co., J. H., Buffalo, N. Y.
Vulco—Belts drives, pulleys. Gates Rubber Co., Denver, Colo.
Vyncote—Coatings. Watson-Standard Co., Pittsburgh, Pa.
Vynal—Coatings. Watson-Standard Co., Pittsburgh, Pa.

W. & McD.—Strainers. Watson & McDaniel Co., Philadelphia, Pa.
W-S—Fittings. Watson-Stillman Co., Roselle, N. J.
W & T—Anemometers, feeders, gages indicators, meters, relays. Wallace & Tiernan Co., Inc., Newark, N. J.
W-W—Pipe hangers. Western Wire Products Co., St. Louis, Mo.
Walco-Parmelee—Wrenches. Walworth Co., New York, N. Y.
Walltube—Radiator brackets. Arjac Products Inc., Rochester, N. Y.
Walseal Silbraz—Fittings, valves. Walworth Co., New York, N. Y.
Warco—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Warco—Valves. Bridgeport Brass Co., Bridgeport, Conn.
Wat-a-mat—Water meters. Pfening Co., Fred D., Columbus, O.
Watco—Cooling towers humidifiers, spray nozzles, spraying systems. Water Cooling Corp., New York, N. Y.
Water-Boy—Feeders. Maid-O'-Mist, Inc., Chicago, Ill.
Water-King—Pumps. Peerless Pump Div., Food Machinery Corp., Los Angeles, Calif.
Weaco—Preheaters, thermostats. Warren Electric Appliance Co., Warren, Pa.
Wear-Proof—Pumps. Schneible Co., Claude B., Detroit, Mich.
Wearweld—Electrodes. Lincoln Electric Co. Cleveland, O.
Weathermaker—Unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weather-Man—Regulators, switches, thermostats. Weather Controls Div., Automatic Devices Co., Chicago, Ill.
Weathermaster—Unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weathermatic—Hot water heating systems. Lawler Automatic Controls, Mount Vernon, N. Y.
Weatherstat—Thermostats. Minneapolis-Honeywell Regulator Co. Minneapolis, Minn.
Weatherwood—Insulation. United States Gypsum Co., Chicago, Ill.
Webster-Nesbitt—Unit heaters. Webster & Co., Camden, N. J.
Webster-Nesbitt "Little Giant"—Unit heaters. Nesbitt, Inc., John J., Philadelphia, Pa.
Weco—Gas burners. Webster Engineering Co., Tulsa, Okla.
Wedgbelt—V belts and v-belt drives, pulleys. American Pulley Co., Philadelphia Pa.
Weir—Furnaces, stokers, heaters. Meyer Furnace Co., The, Peoria, Ill.
Weiralead—Lead alloy coated sheets. Weirton Steel Co., Weirton, W. Va.
Weirain—Electrolytic zinc coated sheets. Weirton Steel Co., Weirton, W. Va.
Weldells—Welding fittings. Taylor Forge & Pipe Works, Chicago, Ill.
Weldolets—Fittings. Bonney Forge & Tool Works, Allentown, Pa.
Weldomatic—Arc welders. Westinghouse Electric Corp., East Pittsburgh, Pa.
Weld-On—Heating and cooling surface. Extended Surface Div. of David E. Kennedy, Inc., Brooklyn, N. Y.
Weldotrol—Spot welders. Westinghouse Electric Corp., East Pittsburgh, Pa.
Weld-O-Tron—Arc welders. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westco—Fans. Northwest Foundry and Furnace Co., Portland, Ore.
WesCo—Solenoids. West Coast Electric Mfg. Co., Los Angeles, Calif.
Wesco Giant—Furnaces. Northwest Foundry & Furnace Co., Portland Ore.
Westernaire—Fans. Western Engineering & Mfg. Co., Los Angeles, Calif.
Westo—Water treatment. Western Chemical Co., Kansas City, Mo.
Westherm VisOdry — Dehydrators. Western Thermal Equipment Co., Los Angeles, Calif.
Whirlcone—Spray nozzles. Water Cooling Equipment Corp., St. Louis, Mo.
Whirljet—Spray nozzles. Spraying Systems Co., Chicago, Ill.
White Star—Valves. Powell Co., Wm., Cincinnati, O.
Whitson—Steam traps. Healy Ruff Co. St. Paul, Minn.
Whiz—Drills. Paramount Products Co., New York, N. Y.
Wilco—Bi-metals. Wilson Co., H. A., The Newark, N. J.
Wilco—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Williams-Hager—Valves. Williams Gauge Co., Pittsburgh, Pa.
Wilson—Arc welders. Air Reduction Sales Co., New York, N. Y.
Wind-O-Vent—Window ventilator and filter units. Reed Unit-Fans, Inc. New Orleans, La.
Wingfoil—Fans, ventilators. Wing Mfg. Co., L. J., New York, N. Y.
Winkler—Stokers. U. S. Machine Corp., Lebanon, Ind.
Winter-Chaser—Air conditioning units, furnaces, heaters. Campbell Heating Co., Des Moines, Ia.
Wissco—Grills. Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Witch—Bolts, hangers, protectors. Carpenter & Paterson, Inc., East Boston, Mass.
Wolverine—Fans, ventilators. Belanger Fan & Blower Co., Detroit, Mich.
Wonder—Tubing benders. American Pipe Bending Machine Co., Poultney, Vt.

X-L—Gaskets, packing. Excelsior Leather Washer Co., Rockford, Ill.
Xacto—Meters. Bowser, Inc., Fort Wayne, Ind.
"X" Boilerliquid—Compounds. X Laboratories, Inc., New York, N. Y.
"X" Flush-Rustoff—Boiler cleaning compounds. X Laboratories, Inc., New York, N. Y.
"X" Pipejoin—Cement and compounds. X Laboratories, Inc., New York, N. Y.
Xit—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.

Yager's—Solder. Benson Co., Inc., Alex R., Hudson, N. Y.
Yarway—Alarms, clamps, expansion joints, nozzles, strainers traps, valves. Yarnall-Waring Co., Philadelphia, Pa.
Yellow-Jacket—Heating boilers. Burnham Boiler Corp., Irvington, N. Y.
Yoloy—Pipe, sheet, tubing. Youngstown Sheet & Tube Co., Youngstown, O.
Yorkaire—Unit air coolers. York Corp., York, Pa.

Zecret—Insulation. Robinson Insulation Co., Great Falls, Mont.
Zeph Air—Heaters. XXth Century Heating and Ventilating Co., Akron, O.
Zero—Cement, refractories. Standard Fuel Engineering Co., Detroit, Mich.
Zig Zag—Heat exchangers. Stout & Sons, David, St. Louis, Mo.
Zincgrip—Sheets. American Rolling Mill Co., Middletown, O.
Zono—Combustion chambers. Robinson Insulation Co., Great Falls, Mont.
Zonolite—Insulation. Munn and Steele, Inc., Newark, N. J.
Zonolite—Insulation, refractories and refractory cement. Robinson Insulation Co., Great Falls, Mont.
Zonolite—Insulation. Universal Zonolite Insulation Co., Chicago, Ill.

DIRECTORY SECTION

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 3—MANUFACTURERS' ADDRESSES

A & J Co., 844-848 W. 59th St., Chicago 21, Ill.
A-J Mfg. Co., 2119 Washington St., Kansas City, Mo.
Acadia Synthetic Products Div., Western Felt Works, 4115 Ogden Ave., Chicago, Ill.
Accurate Mfg. Works, 2336-38 Milwaukee Ave., Chicago 47, Ill.
Accurate Metal Weatherstrip Co., Inc., 216 E. 26th St., New York 10, N. Y.
Ace Engineering Co., 1435 W. 15th St., Chicago 8, Ill.
Acer & Whedon, Inc., Medina, N. Y.
Acheson Mfg. Co., Braddock P. O., Rankin, Pa.
Acker Organization, Inc., W. M., 3167 Fulton Rd., Cleveland, O.
Ackermann Mfg. Co., Wheeling, W. Va.
Acme Asbestos Covering & Flooring Co., 236 N. Elizabeth St., Chicago 7, Ill.
Acme Electric Welder Co., 2618 Fruitland Rd., Los Angeles 11, Calif.
• Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich.
Acme Mfg. Co., State Rd. below Rhawn St., Holmesburg, Philadelphia 36, Pa.
Acme Refining Co., The, W. 56th & W. & L. E. Ry., Cleveland, O.
Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.
Acme White Lead & Color Works, 8250 St. Aubin Ave., Detroit 11, Mich.
Acorn Refining Co., 8001 Franklin Ave., Cleveland, O.
Acro Electric Co., 1392 Superior Ave., Cleveland 14, O.
Activator Process Sales Co., 501 S. Marengo Ave., Alhambra, Calif.
Adam Electric Co., Frank, 3650 Windsor St., St. Louis, Mo.
Adams Co., The, E. 4th St., P. O. Box 268, Dubuque, Ia.
Adams Co., Inc., R. P., 225-7 E. Park Dr., Buffalo 17, N. Y.
Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago 32, Ill.
Advance Electric & Relay Co., 1260 W. Second St., Los Angeles 26, Calif.
Advance Fan & Blower Co., 3428 Bagley, Detroit, Mich.
Advance Insulating Co., Magee Bldg., Pittsburgh, Pa.
Aeolus Dickinson, 3320 S. Artesian Ave., Chicago 8, Ill.
Aerofin Corp., 410 S. Geddes St., Syracuse, N. Y.
Aeroil Products Co., Park Ave. at 57th St., West New York, N. J.
Aeroquip Corp., East St., Jackson, Mich.
Aerotec Co., White Plains, N. Y.
Aerovent Fan Co., 710 E. Ash St., Piqua, O.
Agaloy Tubing Co., Springfield, O.
Aget-Detroit Co., 613 First National Bank Bldg., Ann Arbor, Mich.
Agnew Electric Co., Milford, Mich.
Agnew & Tomlinson, 10-26 Jackson Ave., Long Island City 1, N. Y.
Ahlberg Bearing Co., 3081 W. 47th St., Chicago 32, Ill.
Air Conditioning Products Co., 1230-18th St., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, O.
• Air Devices, Inc., 17 E. 42nd St., New York 17, N. Y.
• Air Equipment Sales Co., 416 W. Eighth St., Los Angeles 14, Calif.
Air Filter Corp., 2514 W. Lisbon Ave., Milwaukee 5, Wis.
Air Filter Engineering Co., 2450 S. Prairie Ave., Chicago 16, Ill.
Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.
• Air & Refrigeration Corp., 475 Fifth Ave., New York 17, N. Y.
Aire-Foile Fan & Blower Co., 4737 W. Vernor Highway, Detroit, Mich.
Airgard Mfg. Co., 362 W. Erie St., Chicago 10, Ill.
Airmaster Corp., 4317 Ravenswood Ave., Chicago 13, Ill.
Air-Maze Corp., 5200 Harvard Ave., Cleveland 5, O.
AirO-Fin Register Co., 21700 Wyoming, Detroit 20, Mich.
Air-Stream Filter Corp., 2100 Washington Ave., St. Louis 3, Mo.
• Airtemp, Div. of Chrysler Corp., 1119 Leo St., Dayton 1, O.
• Airtherm Mfg. Co., 711 S. Spring Ave., St. Louis 10, Mo.
Airwasher Corp., 1122 N. Washington Ave., Lansing, Mich.
Ajax Flexible Coupling Co., Westfield, N. Y.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., 216-220 E. Front St., Cincinnati 2, O.
Akron Metallic Gasket Co., 155 N. Union, P. O. Box 911, Akron 9, O.
Akwa Heaters, Inc., 1955 Park Ave., New York 35, N. Y.
Alabama Pipe Co., Anniston, Ala.
Aladdin Heating Corp., 2222 San Pablo Ave., Oakland 12, Calif.
Albertson & Co., Inc., Sioux City 3, Ia.
Albright Equipment Co., 100 Station St., Johnstown, Pa.
• Alco Valve Co., 865 Kingsland Ave., St. Louis 5, Mo.
Aldrich Co., The, Wyoming, Ill.
Aldrich Pump Co., 4 Pine St., Allentown, Pa.
Alexander Bros., 406 N. 3rd, Philadelphia, Pa.
Alfol Insulation Co., Inc., 155 E. 44th St., New York 17, N. Y.
All Metal Weatherstrip Co., 2241 N. Knox Ave., Chicago 39, Ill.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.
Allen Billmyre Div. of Lamson Corp., 431 Fayette Ave., Mamaroneck, N. Y.
• Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.
Allen Corp., 9767 Erwin Ave., Detroit 13, Mich.
Allen Stoker Co., 235 S. Penn St., Allentown, Pa.
• Alliance Mfg. Co., Alliance, O.
Allied Control Co., Inc., 2 East End Ave., New York, N. Y.
Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4, Ind.
Allington & Curtis Mfg. Co., 1500 Holland Ave., Saginaw, Mich.
• Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Allis Co., Louis, The, 427 E. Stewart St., Milwaukee 7, Wis.
Alloy Steel Products Co., 1506 W. Elizabeth Ave., Linden, N. J.
Allpax Co., Inc., Mamaroneck, N. Y.
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.
Alphil Spot Welding Co., 1058 Pacific St., Brooklyn, N. Y.
Alrose Chemical Co., Providence, R. I.
Alten's Foundry & Machine Works, 226 W. Wheeling St., Lancaster, O.
Alton Mfg. Co., 1111 Camp St., Dallas 2, Tex.
Alton Mineral Wool Insulation Co., 1415 S. Compton, St. Louis 4, Mo.
Aluminum Co., of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
Amercoat Div., American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif.
Amerform Corp., Real Estate Trust Bldg., Philadelphia 7, Pa.
American Agile Corp., 5806 Hough Ave., Cleveland 3, O.
American Air Conditioning Co., Boulevard Bldg., Detroit, Mich.
• American Air Filter Co., Inc., 373 Central Ave., Louisville 8, Ky.
American Automatic Typewriter Co., 614 N. Carpenter St., Chicago, Ill.
• American Blower Corp., Detroit 32, Mich.
• American Brass Co., 414 Meadow St., Waterbury 88, Conn.
American Car & Foundry Co., 30 Church St., New York 8, N. Y.
American Cast Iron Pipe Co., 2930 N. 16th St., Birmingham 2, Ala.
American Coal Burner Co., 12-20 E. Erie St., Chicago 11, Ill.
American Coils, Inc., 25-27 Lexington St., Newark 5, N. J.
American Coolair Corp., 3604 Mayflower St., P. O. Box 2300, Jacksonville 3, Fla.
American Cooling Tower Co., 2710 McGee St., Kansas City 8, Mo.
American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.
American District Steam Co., 25 Bryant St., North Tonawanda, N. Y.
American District Telegraph Co., 155 Sixth Ave., New York, N. Y.
American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia 25, Pa.
American Flange & Mfg. Co., Inc., 1901 R. C. A. Bldg., New York 20, N. Y.
American Flexible Coupling Co., 1801 Pittsburgh Ave., Erie, Pa.
American Foundry Equipment Co., 619 S. Byrkit St., Mishawaka, Ind.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Furnace Co., 2719-31 Delmar Blvd., St. Louis 3, Mo.
American Gas Accumulator Co., 1027 Newark Ave., Elizabeth 3, N. J.
American Hair & Felt Co., 1828 Merchandise Mart, Chicago 54, Ill.
American Hammered Piston Ring Div., Koppers Co., Bush and Hamburg Sts., Baltimore, Md.
American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.
American Heat Corp., 491 Dutton St., Lowell, Mass.
American Injector Co., 1481-14th St., Detroit 16, Mich.
American Instrument Co., Silver Springs, Md.
American K. A. T. Corp., 331 Madison Ave., New York 17, N. Y.
American-Larson Ventilating Co., 1004 Keystone Bank Bldg., Pittsburgh 22, Pa.
American Locomotive Co., Alco Products Div., 30 Church St., New York 8, N. Y.
American Locomotive Co., Diesel Engine Div., Auburn, N. Y.
American Machine Products Co., 401 S. Third Ave., Marshalltown, Ia.
American Manganese Bronze Co., Rhawn & Hegerman Sts., Philadelphia, Pa.
American-Marietta Co., 43 E. Ohio St., Chicago 11, Ill.
American-Marsh Pumps, Inc., 60 Capital Ave., N. E., Battle Creek, Mich.
American Metal Hose Branch, American Brass Co., 67 Jewelry St., Waterbury 88, Conn.
American Metal Products Co., 730 Hudgins St., Box 66, Sylvania Sta., Fort Worth 9, Tex.
American Metal Weather Strip Co., 144 N. Division Ave., Grand Rapids 2, Mich.
American Meter Co., Inc., 60 E. 42nd St., New York 17, N. Y.
American Moistening Co., 260 W. Exchange St., Providence, R. I.
American Molded Products Co., 1644 N. Honore St., Chicago 22, Ill.
American Nickeloid Co., 113 Second St., Peru, Ill.
American Photocopy Equipment Co., 2849 N. Clark St., Chicago 14, Ill.
• American Pipe Bending Machine Co., Inc., 17 Furnace St., Poultney, Vt.
American Pipe Tool Co., 4856 W. Kinzie St., Chicago 44, Ill.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29, Pa.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh 22, Pa.
• American Rolling Mill Co., The, 461 Curtis St., Middletown, O.
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.
American Solder & Flux Co., 2152 E. Norris St., Philadelphia 25, Pa.
American Steel Band Co., Box 565, Pittsburgh 30, Pa.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Rockefeller Bldg., Cleveland 13, O.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

American Sterilizer Co., Erie, Pa.
American Teksag Products Co., Inc., 395 N. MacQuesten Pkwy., Mt. Vernon, N. Y.
● American Thermal Industries, 440 Illinois, Detroit 1, Mich.
American Thermometer Co., 2907 Clark Ave., St. Louis, Mo.
American Ventilating Hose Co., 15 Park Row, New York 7, N. Y.
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo 4, O.
American Water Softener Co., Lehigh Ave. and 4th St., Philadelphia 33, Pa.
American Welding & Mfg. Co., Griswold St.. N. E., Warren, O.
American Well Wks., 100 N. Broadway, Aurora, Ill.
American Zinc Products Co., Greencastle, Ind.
Ames Hydrovac, Inc., 290 Scholes St., Brooklyn 6, N. Y.
Ames Iron Works, Division of Pierce Butler Radiator Corp., Oswego, N. Y.
Amp Corp., 2921 Locust St., St. Louis 3, Mo.
Ampex Electric Corp., 1155 Howard Ave., P. O. Box "AP," San Carlos, Calif.
Ampion Corp., 488 47th St., Long Island City 1, N. Y.
Anchor Packing Co., 401 N. Broad St., Philadelphia 8, Pa.
Andale Co., 1740 Cherry St., Philadelphia 3, Pa.
Andersen Corp., Bayport, Minn.
● Anderson Co., V. D., The, 1949 W. 96th St., Cleveland 2, O.
Anderson Engine & Foundry Co., Anderson, Ind.
Anderson Products, Inc., 17 Tudor St., Cambridge 39, Mass.
● Anderson-Stolz Corp., 1731 Walnut St., Kansas City 8, Mo.
● Anemostat Corp. of America, 10 E. 39th St., New York 16, N. Y.
Anetsberger Bros., 3505 Elston Ave., Chicago, Ill.
● Annis Air Filters, 602 S. Central Ave., Glendale 4, Calif.
Ansul Chemical Co., Refrigeration Div., Marinette, Wis.
Anti-Friction Bearings Co., 2020 S. Figueroa St., Los Angeles 7, Calif.
Apex All Weather Products, Engineering Div., 228 N. La Salle St., Chicago 1, Ill.
● Apex Engineering Co., 205 W. Wacker Dr., Chicago 6, Ill.
Apollo Steel Co., 609 Warren Ave., Apollo, Pa.
Applied Mechanics Co., 167 Oliver St., Boston 10, Mass.
April Showers Co., 4126 Eighth St., N.W., Washington 11, D. C.
Aqua-Mist Co., 426 Jefferson St., Topeka, Kans.
Aqua-Sorb Co., 21 S. 16th St., East Orange, N. J.
Aquatic Chemical Laboratories, Inc., 95 Liberty St., New York 6, N. Y.
Arabol Mfg. Co., 10 E. 42nd St., New York 17, N. Y.
Arco Co., 7301 Bessemer Ave, Cleveland 4, O
Arcos Corp., 1515 Locust St., Philadelphia 2, Pa.
Arcweld Mfg. Co., Inc., 3469 Third Ave., W., Seattle 99, Wash.
Arens Controls, Inc., 2267 S. Halsted St., Chicago, Ill.
Arex Co., 333 N. Michigan Ave., Chicago 1, Ill.
Arjac Products Inc., 55-59 Halstead St., Rochester 10, N. Y.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Armour Ammonia Works, 1355 W. 31st St., Chicago, Ill.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Rd., Chicago, Ill.
Armstrong Bros. Tool Co., 317-357 N. Francisco Ave., Chicago, Ill.
Armstrong Co., The, Post Ave. and South St., Detroit 17, Mich.
Armstrong Cork Co., 4400 Concord St., Lancaster, Pa.
Armstrong Heat Control Co., 8816 S.E. 17th Ave., Portland 2, Ore.
● Armstrong Machine Wks., 874 Maple St., Three Rivers, Mich.
Armstrong Mfg. Co., 303 Knowlton St., Bridgeport 8, Conn.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorne St., Hartford, Conn.
Arrowhead Rubber Co., 2244 E. 37th St., Los Angeles 11, Calif.
Art Valve Co., 4662 N. Lincoln Ave., Chicago 25, Ill.
Ashton Valve Co., 161-1st St., Cambridge 42, Mass.
Askania Regulator Co., 1603 S. Michigan Ave., Chicago 16, Ill.
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis 9, Ind.
Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York, N. Y.
Atlantic Steel Boiler Co., 21st St. and Washington Ave., Philadelphia 46, Pa.
Atlantic Steel Co., P. O. Box 1714, Atlanta 1, Ga.
Atlas Chemical Co., Marietta, O.
Atlas Utilities Co., Inc., 17 Exchange St., Providence 3, R. I.
Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Atlas Welding Accessories Co., 14820 Wyoming Ave., Detroit 21, Mich.
Auburn Burner Co., Lock Box 269, Auburn, Ind.
Auburn Foundry Inc., Stoker Div., Auburn, Ind.
Auditorium Conditioning Corp., 17 E. 42nd St., New York, N. Y.
● Auer Register Co., 3608 Payne Ave., Cleveland 14, O.
Aurora Pump Co., 619 Loucks St., Aurora, Ill.
Austin-Mason Co., 15 Park Row, New York, N. Y.
● Autempco Corp., 521 Fifth Ave., New York 17, N. Y.
Autoforce Ventilating System, 244 Washington St., Boston 8, Mass.
● Automatic Control Co., 1011 University Ave., St. Paul 4, Minn.
Automatic Electric Mfg. Co., 10 State St., Mankato, Minn.
Automatic Firing Corp., 6504 Olive Blvd., St. Louis 5, Mo.
Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh 21, Pa.
● Automatic Products Co., 2460 N. 32nd St., Milwaukee 10, Wis.
Automatic Pump & Softener Corp., 1907 Kishwaukee St., Rockford, Ill.
Automatic Switch Co., 41 E. 11th St., New York 3, N. Y.
Automatic Temperature Control Co., Inc., 44 E. Logan St., Philadelphia 44, Pa.
Automotive Maintenance Machinery Co., North Chicago, Ill.
Axor Corp., 107 Montgomery Ave., Irvington, N. J.

B/W Controller Corp., 2200 E. Maple Ave., Birmingham, Mich
Babbitt Chemical Specialties Co., 630 Fifth Ave., New York 20, N. Y.
Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8, Pa.
Bache, Semon & Co., Greenwich & Morton Sts., New York 14, N. Y.
Badger Fire Extinguisher Co., 624 Somerville Ave., Somerville 43, Mass.
● Badger & Sons Co., E. B., 75 Pitts St., Boston 14, Mass.
Badham Insulation Co., Inc., Birmingham, Ala.
Baer Bros., 438 W. 37th St., New York 18, N. Y.
Bahnson Co., 1001 S. Marshall St., Winston-Salem, N. C.
Bailey Co., Chas. M., 667 Folsum St., San Francisco 7, Calif.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.
● Baker Ice Machine Co., Inc., 1531 Evans St., Omaha 1, Neb.
Baldor Electric Co., 4353 Duncan Ave., St. Louis 10, Mo.
Baldwin Belting, Inc., 85 Chambers St., New York 7, N. Y.
Baldwin De La Vergne Sales Corp., Paschall P. O., Philadelphia, Pa.
Baldwin-Hill Co., 531 Klagg Ave., Trenton 2, N. J.
Baldwin Locomotive Works, Southwork Div., Eddystone, Pa.
Ball Welding Works, 57 Tehama St., San Francisco 5, Calif.
Ballantyne Co., 1707-11 Davenport St., Omaha 2, Neb.
Balloffet Dies and Nozzle Co., 6825 Adams St., Guttenberg, N. J.
● Baltimore Aircoil Co., 402 Calvin St., Baltimore 2, Md.
Bantam Bearings Div, The Torrington Co, South Bend 21, Ind.
Barber-Colman Co., 1228 Rock St., Rockford, Ill.
Barber Gas Burner Co., 3704 Superior Ave., Cleveland 14, O.
Barclay, Inc., Robert, 128 N. Peoria St., Chicago, Ill.
Barco Mfg. Co., Not Inc., 1801 Winnemac Ave., Chicago 40, Ill.
Bardco Mfg. & Sales Co., 2450 E. 23rd St., Los Angeles, Calif.
Bargar Sheet Metal Co., 12401 Euclid St., Cleveland, O.
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston 30, Mass.
Barnes Manufacturing Co., Mansfield, O.
Barnes Tool Co., The, 152 Brewery St., New Haven 6, Conn.
Barrett Div., The, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Barrett, Haentjens & Co., Hazleton, Pa.
Barrett Machine Co., 912-916 Behan St., N. S., Pittsburgh 12, Pa.
Bart Mfg. Co., 227 Main St., Belleville 9, N. J.
Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich.
Barton Co., 64 Glenwood Ave., Minneapolis, Minn.
Barton Instrument Co., 3500 Union Pacific Ave., Los Angeles 23, Calif.
Basic Refractories, Inc., 845 Hamma Bldg., Cleveland 15, O.
Bastian-Morley Co., Inc., LaPorte, Ind.
Bath Co., Cyril, The, E. 70th and Machinery Ave., Cleveland 8, O.
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.
Bayer Co., 4030 Chouteau Ave., St. Louis 10, Mo.
Bayley Blower Co., 1817 S. 66th St., Milwaukee 14, Wis.
Beach-Russ Co., 64A Church St., New York, N. Y.
Beacon-Morris Corp., 60 Brainerd Rd., Allston, Boston 34, Mass.
● Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Bearings Co. of America, 501 Harrisburg Ave., Lancaster, Pa.
Bearlee Products Co, 1255 S. Monroe, Green Bay, Wis.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Beatty Machine & Mfg. Co., 934 150th St., Hammond, Ind.
Beaver Pipe Tools, Inc., 310 Dana Ave., Warren, O.
Beck Engineering Combustion Kompany, 2100 Cole St., St. Louis 6, Mo.
Beckett & Co., Thomas, 2118 Griffin St., Dallas 2, Tex.
Beckley Perforating Co., 301 North Ave., Garwood, N. J.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Belco Exhaust Fan Mfg. Co., 3830-32 Olive St., St. Louis 8, Mo.
Belfield Co., H., 435 N. Broad St., Philadelphia 23, Pa
Belknap Mfg. Co., 800 Union Ave., Bridgeport 1, Conn.
● Bell & Gossett Co., Morton Grove, Ill.
Belmont Packing & Rubber Co., The, Butler & Sepviva Sts., Philadelphia 37, Pa.
Belmont Smelting & Refining Wks., Inc., 349 Belmont Ave., Brooklyn 7, N. Y.
Bendix Aviation Corp., Eclipse-Pioneer Div., Metal Hose Dept., Teterboro, N. J.
Benjamin Air Aifle Co., Co., 1527 S. 8th St., St. Louis 4, Mo.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Bennett Oil Co., 964 S. Saddle Creek Rd., Omaha 6, Neb.
Benson Co., Inc., Alex R., 1040 Bay Rd., So., Hudson, N. Y.
Berger Bros. Co., 229-237 Arch St., Philadelphia 6, Pa.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton 5, O.
Bern's Specialty Mfg. Co., 2278 Elston Ave., Chicago, Ill.
Bernz Co., Otto, 280 Lyell Ave., Rochester 6, N. Y.
Bertsch & Co., Inc., Church St., Cambridge City, Ind.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee 7, Wis.
Bethlehem Foundry & Machine Co., W. Second St., Bethlehem, Pa.
● Bethlehem Steel Co., Bethlehem, Pa.
Bettendorf Oil Burner Co., 1400 E. Linn St., Marshalltown, Ia.
Betz Corp., 460 State St., Hammond, Ind.
Beverly Shear Mfg. Co., 3004 111th St., Chicago 43, Ill.
Bien Air Conditioning Co., 362 W. Garvey Ave., Monterey Park, Calif.
Biersach & Niedermeyer Co., 1937 N. Hubbard St., Milwaukee 12, Wis.
Bigelow Co., 174 River St., New Haven 13, Conn.
Biggs Boiler Wks. Co., The, Case Ave. and B. & O. R. R., E. Akron 5, O.
Bignall & Keeler Machine Wks., Edwardsville, Ill.
Billings & Spencer Co., 1 Laurel St., Hartford 6, Conn.
Binks Mfg. Co., 3114-40 Carroll Ave., Chicago 12, Ill.
Birchfield Boiler, Inc., 2503 E. 11th St., Tacoma 1, Wash.
Bird-Archer Co., 4337 North American St., Philadelphia 40, Pa.
● Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland 14, O.
● Black & Decker Mfg. Co., 628 Pennsylvania Ave., Towson 4, Md.
Black Magic Products Co., P. O. Box 1703, Tulsa, Okla.
Black Mfg. Co., The, 1426 W. Baltimore St., Baltimore 23, Md.
Black-Sivalls & Bryson, Inc., 7501 E. 10th St., Kansas City 3, Mo.
Blackburn-Smith Mfg. Co., River St., Hoboken, N. J.
Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee 1, Wis.
Blackmer Pump Co., 1920A Century Ave., S. W., Grand Rapids 9, Mich.
Blaisdell Compressor Co., 227 Fulton St., New York, N. Y.
Bliss Co., E. W., 450 Amsterdam Ave., Detroit 2, Mich.
Blocksom & Co., E. 5th St., Michigan City, Ind.
Blood Brothers Machine Co., Div. of Standard Steel Spring Co., Allegan, Mich.
Blower Application Co., 918 N. Fourth St., Milwaukee 3, Wis.
Blue Ridge Talc Co., Inc., Henry, Va.

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Blue Seal Chemical Co., 177 Westfield Ave., W. Roselle Park, N. J.
Bodine Electric Co., 2254 W. Ohio St., Chicago 12, Ill.
Bogue Electric Co., 37 Kentucky Ave., Paterson 3, N. J.
Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich.
Boiler Room Equipment, Inc., 468 Fourth Ave., New York 16, N. Y.
Bonafide Genasco, Inc., 295 Fifth Ave., New York 16, N. Y.
Bonney Forge & Tool Wks., 350 Green St., Allentown, Pa.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.
Borg-Erickson Corp., 469 E. Ohio St., Chicago 11, Ill.
Borm Mfg. Co., Elgin, Ill.
Boston Auto Gage Co., 70 West St., Pittsfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass.
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia 47, Pa.
Bowen Engineering, Inc., Garwood, N. J.
Bowser, Inc., 1302 E. Creighton Ave., Fort Wayne 2, Ind.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Brabender Corp., Rochelle Park, N. J.
Brauer Supply Co., A. G., 2100 Washington Ave., St. Louis 3, Mo.
Breidert Co., G. C., 634 S. Spring St., Los Angeles 14, Calif.
Bremil Mfg. Co., Box 1030, Erie, Pa.
Bridgeport Brass Co., 30 Grand St., Bridgeport 2, Conn.
Bridgeport Thermostat Co., Inc., Connecticut Ave., Bridgeport 1, Conn.
Bristol Co., The, P. O. Box 1790, Waterbury 91, Conn.
• Bronson Fan Mfg. Co., 1237 Riverside Dr., Los Angeles 31, Calif.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia 44, Pa.
Brookfield Engineering Laboratories, Sharon, Mass.
Brooks Equipment Corp., 217 Hudson St., Hoboken, N. J.
Bros Boiler & Mfg. Co., Wm., 1057 Tenth Ave., S. E., Minneapolis 14, Minn.
Brown-Brockmeyer Co., Inc., P. O. Box 976, Dayton 1, O.
Brown Co., 500 Fifth Ave., New York, N. Y.
Brown Fintube Co., The, Elyria, O.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia 44, Pa.
• Brownell Co., 300 N. Findlay St., Dayton 1, O.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Brundage Co., The, 500-514 N. Park St., Kalamazoo 11, Mich.
Bruning Co., Inc., Charles, 4754 Montrose Ave., Chicago 41, Ill.
Brunner Mfg. Co., 1821 E. Broad St., Utica 1, N. Y.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland 10, O.
Bubar, Hudson H., Old Lyme, Conn.
Buckeye Tools Corp., 29 W. Apple St., Dayton 1, O.
Buda Co., Harvey, Ill.
Buffalo Bolt Co., North Tonawanda, N. Y.
• Buffalo Forge Co., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y.
• Buffalo Pumps, Inc., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Tank Corp., Dunellen, N. J.; Buffalo, N. Y.
Buffalo Turbine Corp., 2165 Bailey Ave., Buffalo 11, N. Y.
Buflovac Equipment Div. of Blaw-Knox Co., 50 Winchester Ave., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, 9 Codding St., Providence 1, R. I.
Bullard Co., The, 286 Canfield Ave., Bridgeport 2, Conn.
Bump Pump Co., La Crosse, Wis.
Bundy Steam Trap Co., Nashua, N. H.
Bundy Tubing Co., 8101 E. Jefferson Ave., Detroit 14, Mich.
• Burden Co., 1000 N. Orange Dr., Los Angeles 38, Calif.
Burke Electric Co., 1201 W. 12th St., Erie, Pa.
Burke Stoker & Mfg. Co., 921 W. 19th St., Chicago, Ill.
Burling Instrument Co., Air Conditioning Div., 253 Springfield Ave., Newark 3, N. J.
• Burnham Boiler Corp., Main St., Irvington, N. Y.
Burnham Stoker Co., 505 Columbia St., Vancouver, Wash.
Burnley Battery & Mfg. Co., Clay St., North East, Pa.
Burrows Mfg. Co., F. A., 318 E. Poplar St., York, Pa.
Burt Mfg. Co., 41 E. South St., Akron 11, O.
Bury Compressor Co., 18th & Cascade Sts., Erie, Pa.
• Bush Mfg. Co., 100 Wellington St., Hartford 6, Conn.
Byers Co., A. M., Clark Bldg., Pittsburgh 22, Pa.
Byron Jackson Co., P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

C-B Tool Co., Wabank Rd., Lancaster, Pa.
C & H Air Conditioning Fan Co., Inc., 1603 DeKalb Ave., N. E., Atlanta 6, Ga.
Cabot, Inc., Samuel, 141 Milk St., Boston 9, Mass.
Calbar Paint & Varnish Co., 2612-26 N. Martha St., Philadelphia 25, Pa.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Caldwell Co., Wm. J. 1129 Vermont Ave., N. W., Washington 5, D. C.
Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa.
California Brass Mfg. Co., 1447 Naud St., Los Angeles 12, Calif.
Callahan Can Machine Co., Inc., 80 Richard St., Brooklyn, N. Y.
Calorider Corp., 1 Atlantic St., Stamford, Conn.
Campbell Engineering Co., 918 N. Union St., Appleton, Wis.
• Campbell Heating Co., 31st & Dean, P. O. Box 833, Des Moines 4, Ia.
Campbell Heating Co., E. K., 1606 Main St., Kansas City 8, Mo.
Canatsey Electric Mfg. Co., 2207 McGee St., Kansas City 8, Mo.
Cannon Chemical Co., Inc., 210 Broadway, Everett 49, Mass.
Canton Stoker Corp., 407 Andrew Place, S. W., Canton 1, O.
Canvas Products Co., 1236 S. 7th St., St. Louis 4, Mo.
Capitol Brass Works, Div. of Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich.
Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y.
Carey Mfg. Co., Philip, Wayne Ave., Lockland, Cincinnati 15, O.
Cargocaire Engineering Corp., 15 Park Row, New York 7, N. Y.
Carlin Co., Anthony, 2717 E. 75th St. Cleveland, O.
Carling Turbine Blower Co., 25 St. John's Rd., Worcester 3, Mass.
Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh 30, Pa.
Carnes, Inc., John R., Greenlawn Ave. & Erie R. R., Lima, O.
Carney Co., Inc., The, Mankato, Minn.
Carolina Aniline & Extract Co., Inc., 301 S. Cedar St., Charlotte 1, N. C.
Carpenter Heating & Stoker Co., 1929 E. 55th St., Cleveland 3, O.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston 28, Mass.
Carrier Corp., 302 S. Geddes St., Syracuse 1, N. Y.
Carter Paint Co., 310 N. Main St., Liberty, Ind.
• Carty & Moore Engineering Co., 511 W. Larned St., Detroit 26, Mich.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo 3, N. Y.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Cash Valve Mfg. Co., A. W., 6621 E. Wabash Ave., Decatur 80, Ill.
Cashin Co., W. D., 69 A. St., Boston 27, Mass.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Caterpillar Tractor Co., 600 W. Washington St., Peoria, Ill.
Catskill Metal Works, Inc., Catskill, N. Y.
Celotex Corp., The, 120 S. La Salle Bldg., Chicago 3, Ill.
Cement Lined Pipe Co., 93 Brookline St., Lynn, Mass.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland 4, O.
Central Die Casting & Mfg. Co., Inc., 2935 W. 47th St., Chicago, Ill.
Central Foundry Co., 386 Fourth Ave., New York 16, N. Y.
Central Rubber & Steel Corp., P. O. Box 420, Findlay, O.
Central Station Steam Co., 2920 E. Woodbridge St., Detroit 7, Mich.
Central Wire & Iron Works, 621 E. Locust St., Des Moines, Ia.
Centrifix Corp., 3029 Prospect Ave., Cleveland 15, O.
Centri-Spray Corp., 14290 Meyers Rd., Detroit 27, Mich.
Century Aircraft Co., 5601 W. Century Blvd., Inglewood, Calif.
Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
Century Engineering Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Century Fan & Ventilator Co., 45 Cedar St., Stamford, Conn.
Certain-teed Products Corp., 100 E. 42nd St., New York, N. Y.
Certified Flexible Couplings, 369 Lexington Ave., New York 17, N. Y.
Certified Furnace Co., Div. Stainless & Steel Products Co., 1000 Berry Ave., St. Paul 4, Minn.
Chace Co., W. M., 1606 Beard Ave., Detroit 9, Mich.
Chain Belt Co., 1617 W. Bruce, Milwaukee 4, Wis.
Chamberlin Co. of America, 1254 La Brosse St., Detroit 26, Mich.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Champion Furnace Pipe Co., 215 Eaton St., Peoria 3, Ill.
Champion Machine & Forging Co., 3695 E. 78th St., Cleveland 5, O.
Champion Unit Heater Co., 4639-41 Washington Blvd., Chicago 44, Ill.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Char-Gale Mfg. Co., 3127 Hiawatha Ave., Minneapolis 6, Minn.
• Chase Brass & Copper Co., 236 Grand St., Waterbury 91, Conn.
Chase-Shawmet Co., Newburyport, Mass.
Cheeseman-Elliot Co., Inc., Kent Ave., Brooklyn 11, N. Y.
• Chelsea Products, Inc., 1206 S. Grove St., Irvington 11, N. J.
Chelsea Metal Stamping Co., 95 8th Ave., New York 11, N. Y.
Cheney Metal Products Co., 623 Prospect St., Trenton 5, N. J.
Chicago Belting Co., 113-125 N. Green St., Chicago 7, Ill.
Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.
Chicago Die Casting Mfg. Co., 2515 W. Monroe St., Chicago 12, Ill.
Chicago Expansion Bolt Co., 1338 W. Concord Pl., Chicago 22, Ill.
Chicago Fan & Fin Coil Co., 1937 Walnut St., Chicago 12, Ill.
Chicago Filter Co., Joliet, Ill.
Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago 22, Ill.
Chicago Furnace Supply Co., 1278 Clybourn Ave., Chicago, Ill.
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago 32, Ill.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago 14, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Chicago Pump Co., 2323 Wolfram St., Chicago 18, Ill.
Chicago Specialty Mfg. Co., 2954 Lawrence Ave., Chicago 25, Ill.
Chicago Steel Tank Co., 6400 W. 66th, Chicago 38, Ill.
Chicago-Wilcox Mfg. Co., E. 77th St. and Anthony Ave., Chicago, Ill.
Chiksan Co., Brea, Calif.
Chisholm Co., Allen E., 2640 E. Burnside St, Portland, Ore.
Cincinnati Electrical Tool Co., The, 2684 Madison Rd., Cincinnati 8, O.
Cincinnati Shaper Co., Hepple, Garrard and Elam, Cincinnati 25, O.
Cinder Products Corp., 75 Ellenfield St., Providence, R. I.
Circulators & Devices Mfg. Corp., 22 Rose St., New York, N. Y.
Cissell Mfg. Co., W. M., 331 S. First St., P. O. Box 1143, Louisville 1, Ky.
• Clarage Fan Co., Porter St., Kalamazoo 16, Mich.
Clark Bros. Bolt Co., Milldale, Conn.
Clark Controller Co., 1146 E. 152nd St., Cleveland 10, O.
Clark Cooper Co., Palmyra, N. J.
Clark Dust Control Co., 210 N. Mozart St., Chicago, Ill.
Clark Jr. Electric Co., Jas., 615 Bergman St., Louisville 3, Ky.
• Clark Mfg. Co., 1830 E. 38th St., Cleveland 14, O.
Claronex Products, Inc., 239 Java St., Brooklyn, N. Y.
Clauss Shear Co., Fremont, O.
Clay Equipment Corp., Cedar Falls, Ia.
• Clayton & Lambert Mfg. Co., 1701 Dixie Hwy., Louisville 10, Ky.
• Clayton & Lambert Mfg. Co., Middletown Div., Middletown, O.
Clayton Mfg. Co., Alhambra, Calif.
Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis.
Cleghorn Co., 86 Broad St., Boston, Mass.
Cleveland Brass Mfg. Co., 4606 Hamilton Ave., Cleveland, O.
Cleveland Humidifier Co., 7802 Wade Park Ave., Cleveland 3, O.
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland 14, O.
Clifford Mfg. Co., 564 E. First St., Boston, Mass.
Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Clow & Sons, James B., 201-299 N. Talman Ave., Chicago 12, Ill.
Cochrane Corp., 3131 N. 17th St., Philadelphia 32, Pa.
Coe Mfg. Co., Bank St., Painesville, O.
Cohoes Rolling Mill Co., Canvass and Cortland Sts., Cohoes, N. Y.
Cole-Sewell Engineering Co., 2288 University Ave., St. Paul 4, Minn.
Colebrook & Sons., Inc., W. H., 246 Walton St., Syracuse, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

Colonial Alloys Co., Metals Div., Ridge Ave. and Crawford St., Philadelphia 19, Pa.
Columbia Radiator Co., 3400 Walnut St., McKeesport, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), Russ Bldg., 235 Montgomery St., San Francisco 6, Calif.
Columbian Steel Tank Co., 1509 W. 12th St., Kansas City 7, Mo.
Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus 16, O.
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus 8, O.
Combination Boiler Co., Benton Harbor, Mich.
Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.
Combustion Engineering Co., Inc., 200 Madison Ave., New York 16, N. Y.
Comfort Products Corp., 2220 S. Lamesa, Dallas 2, Tex.
Commercial Filters Corp., 18 W. Third, Boston 27, Mass.
Commercial Plastics Co., 201 N. Wells St., Chicago 6, Ill.
Commercial Shearing & Stamping Co., 1775 Logan, P. O. Box 719, Youngstown 1, O.
Commonwealth Brass Corp., 5781-5835 Commonwealth Ave., Detroit 8, Mich.
Commonwealth Electric Welder Mfg. Co., 3200-F W. Oxford St., Philadelphia, Pa.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
● Condenser Service & Engineering Co., Inc., 95 River St., Hoboken, N. J.
Conditionaire Unit Co., 2821 Montrose Ave., Chicago 18, Ill.
Congress Die Casting Div., Congress Tool & Die Co., 3750 E. Outer Drive., Detroit 12, Mich.
Conklin Brass & Copper Co., Inc., T. E., 54-60 Lafayette St., New York 13, N. Y.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Connery Construction Co., 2nd and Luzerne Sts., Philadelphia 40, Pa.
Connor Engineering Corp., W. B., 114 E. 32nd St., New York 16, N. Y.
Conoflow Corp., 2100 Arch St., Philadelphia 3, Pa.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Continental Air Filters, Inc., P. O. Box 1647, Louisville 1, Ky.
Continental Diamond Fibre Co., Newark, Del.
Continental Electric Co., Inc., 323 Ferry St., Newark, N. J.
Continental Motors Corp., Muskegon 82, Mich.
Continental Products Co., 1150 E. 222nd St., Euclid 17, O.
Continental Rubber Wks., 1902 Liberty St., Erie, Pa.
Continental Steel Corp., 1108 S. Main St., Kokomo, Ind.
Controlair Mfg. Co., 1932 S. Compton Ave., Los Angeles, Calif.
Controldtemp Equipment Sales Corp., 236 Butler St., Brooklyn 17, N. Y.
Cook, Inc., A. D., Lawrenceburg, Ind.
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Coolstream Corp., The, 240 Butler St., Brooklyn, N. Y.
Cooper Alloy Foundry Co., Hillside, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
Copeland Refrigeration Corp., Sidney, O.
Coppus Engineering Corp., 344 Park Ave., Worcester 2, Mass.
Corbman Bros., Inc., 315 N. 7th St., Philadelphia 6, Pa.
Cordo Chemical Co., 34 Smith St., Norwalk, Conn.
Cork Import Corp., 39 Park Pl., Englewood, N. J.
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
Corley Co., 629 Grove St., Jersey City 2, N. J.
Corning Glass Works, Corning, N. Y.
Coroaire Heater Corp., The, 1124 Hanna Bldg., Cleveland 15, O.
Cramer Co., Inc., R. W., The, Centerbrook, Conn.
● Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.
Crane Packing Co., 1872 Cuyler Ave., Chicago 13, Ill.
Crawford Co., 3220 W. 31st St., Chicago 23, Ill.
Crescent Tool Co., 230 Harrison St., Jamestown, N. Y.
Crise Mfg. Co., The, 2040 E. Main, Columbus, O.
Crocker-Wheeler Electric Mfg. Co., Div. Joshua Hendy Iron Works, Ampere 14, N. J.
Croll-Reynolds Engineering Co., Inc., 17 Johns St., New York 7, N. Y.
Croll & Son, Jesse G., 2326-2606 Germantown Ave., Philadelphia, Pa.
Crown Controls Co., New Breman, O.
Crown Die & Tool Co., 108 N. Jefferson St., Chicago 6, Ill.
Crown Iron Works Co., 1202 N. E. Tyler, Minneapolis, Minn.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Cryer Trap & Valve Co., Inc., 366 Madison Ave., New York 17, N. Y.
Cuno Engineering Corp., 80 S. Vine St., Meriden, Conn.
Curtis Automotive Devices, Inc., 8 Norwood Ave., Dayton 7, O.
Curtis & Curtis Co., The, 450 Garden St., Bridgeport, Conn.
● Curtis Refrigerating Machine Div., Curtis Mfg. Co., 1950 Kienlen Ave., St. Louis 20, Mo.
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.
Cyclotherm Corp., 90 Broad St., New York 4, N. Y.
Cyrus Shank Co., 625 W. Jackson Blvd., Chicago 6, Ill.

Dahlquist Mfg. Co., Inc., 628 Somerville Ave., Somerville 43, Mass.
Dahlstrom Machine Works, 5014 N. Kedzie Ave., Chicago 25, Ill.
Dahlstrom Metallic Door Co., S. E. cor. E. Second and Buffalo Sts., Jamestown, N. Y.
Daigger & Co., A., 161 W. Kinzie St., Chicago, Ill.
Dallas Engineering Co., Inc., 200 S. Akard, Dallas, Tex.
Dalmo-Victor Co., San Carlos, Calif.
Dalzen Tool & Mfg. Co., 12255 E. Eight Mile Rd., Detroit 5, Mich.
Dampney Co. of America, 1243 River St., Hyde Park, Boston 36, Mass.
Danzer Metal Works Co., Box 201, Hagerstown, Md.
Darcoid Co., Inc., 145 Sixth Ave., New York 13, N. Y.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Dart Mfg. Co., E. M., 134 Thurbers Ave., Providence 5, R. I.
Davey Compressor Co., Kent, O.
Davidson Co., M. T., 43-53 Keap St., Brooklyn 11, N. Y.
Davidson Hy Duty Roof Fan Co., 213 California St., Newton, Mass.
Davies & Co., Wayne, Westboro, Mass.
Davis & Co., Inc., Dean W., 1006 First St, Kentland, Ind.
Davis Co., Inc., Herbert H., 1616 S. Laramie, Chicago, Ill.
Davis Emergency Equipment Co., 83 Halleck St., Newark 4, N. J.
Davis Engineering Corp., 1070 E. Grand St., Elizabeth 4, N. J.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago 8, Ill.
Davison Chemical Corp., The, 20 Hopkins Pl., Baltimore 3, Md.
Day Co., The, 810-830 Third Ave., N. E., Minneapolis 13, Minn.
Dayton-Acme Co., 930 York St., Cincinnati, O.
Dayton Air Compressor Co., Dayton, O.
Dayton-Dowd Co., 115-17 York St., Quincy, Ill.
Dayton Rubber Mfg. Co., 2342 W. Riverview Ave., Dayton 1, O.
● Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis 7, Ind.
Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Ind.
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4, Ill.
Debevoise Co., The, 968 Grand St., Brooklyn 6, N. Y.
DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., P. O. Box 72, Decatur, Ala.
● Decatur Pump Co., 41 Elk St., Decatur 70, Ill.
Defender Instrument & Regulator Co., 815 Clark Ave., St. Louis 2, Mo.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton 2, N. J.
Delavan Engineering Co., 3009 Sixth Ave., Des Moines 9, Ia.
Delco Appliance Div., General Motors Corp., P. O. Box 230, Rochester 1, N. Y.
Delco Products Div., General Motors Corp., 329 E. First St., Dayton 1, O.
Delta-Star Electric Co., 2400 Block, W. Fulton St., Chicago, Ill.
Deming Co., 14 Aetna St., Salem, O.
Demuth & Sons, Charles, 245 Elm Place, Mineola, L. I., N. Y.
Dersch, Gesswein & Neuert, Inc., 4849 W. Grand Ave., Chicago 39, Ill.
Desmond-Stephan Mfg. Co., Urbana, O.
Desolvo Co., The, 719 Foreland St., Pittsburgh 12, Pa.
Despatch Oven Co., 619 S. E. Eighth St., Minneapolis 14, Minn.
d'Este Div., American Chain & Cable Co., Inc., Reading, Pa.
Detroit Air Conditioning Service Co., 1314 Holden Ave., Detroit 2, Mich.
Detroit Brass & Malleable Works, 100 S. Campbell, Detroit 9, Mich.
Detroit Diesel Engine Co., General Motors Corp., 13400 W. Outer Dr., Detroit 23, Mich.
Detroit Graphite Co., 550 12th St., Detroit, Mich.
● Detroit Lubricator Co., 5900 Trumbull Ave., Detroit 8, Mich.
Detroit Seamless Steel Tubes Co., c/o Grand River Station, Box A, Detroit 8, Mich.
Detroit Stamping Co., 337 Midland Ave., Detroit 3, Mich.
Detroit Steel Products Co., 2250 E. Grand Blvd., Detroit, Mich.
Detroit Stoker Co., Fifth Floor, General Motors Bldg., Detroit 2, Mich.
DeVilbiss Co., The, 300 Phillips Ave., Toledo 1, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., 1932 Oliver Bldg., Pittsburgh 22, Pa.
Devoe & Raynolds Co., Inc., 44th St. and 1st Ave., New York 17, N. Y.
Dial Light Co. of America, Inc., 92 West St., New York, N. Y.
Diamond Chain & Mfg. Co., 438 Kentucky Ave., Indianapolis 7, Ind.
Diamond Chemical Products, 17 E. 48th St., New York, N. Y.
Diamond Expansion Bolt Co., Inc., 500 North Ave., Garwood, N. J.
Diamond Iron Works, Inc., P. O. Box 719, Minneapolis, Minn.
Diamond Mfg. Co., 253 W. Eighth St., Wyoming, Pa.
Diamond Power Specialty Corp., P. O. Box 288, Detroit 31, Mich.
Diceler Div. of General Machine & Mfg. Co., Blair St. and Spring Garden Ave., Berwick, Pa.
Dick Co., Inc., R. & J., 24-48 Sade St., Passaic, N. J.
Dickinson, Aeolus, 3320 S. Artesian Ave., Chicago 8, Ill.
Diehl Mfg. Co., Finderne Plant, 1106 Finderne Ave., Somerville, N. J.
Dietzgen Co., Eugene, 2425 Sheffield Ave., Chicago 14, Ill.
Dillon Co., 220-C E. Brady St., Tulsa, Okla.
Dillon Co., Inc., W. C., 5410 W. Harrison St., Chicago 44, Ill.
Dillon Steam Boiler Wks., Inc., D. M., Crocker St., Fitchburgh, Mass.
Dixon Crucible Co., Joseph, Wayne & Monmouth Sts., Jersey City, N. J.
Doall Co., The, 254 N. Laurel Ave., Des Plaines, Ill.
Dockson Corp., 3839 Wabash Ave., Detroit 8, Mich.
Dockstader, Inc., S. E., 1128 Munsey Bldg., Washington 4, D. C.
Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind.
Doheny Co, John J., 326 Lake St., Belmont, Mass.
● Dole Valve Co., The, 1933 Carroll Ave., Chicago 12, Ill.
Dollinger Corp., 9 Centre Park, Rochester 3, N. Y.
Domestic Engine & Pump Co., Shippensburg, Pa.
Douglas Automatic Controls Co., 4505 Firestone Blvd., South Gate, Calif.
Dow Chemical Co., The, Midland, Mich.
Dow Corning Corp., Midland, Mich.
● Dowell Inc., 524 Kennedy Bldg., Tulsa 3, Okla.
Downingtown Iron Works, Wallace Ave., Downingtown, Pa.
Doyle & Roth Mfg. Co., Hawkins St. at C R R of N J, Newark 5, N. J.
● Dravo Corp., Machinery Div., 300 Penn Ave., Pittsburgh 22, Pa.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles 21, Calif.
Dreis & Krump Mfg. Co., 7404 Loomis Blvd., Chicago 36, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., 490 Fisher Ave., Bradford, Pa.
Drico Industrial Corp., 29 Broadway, New York 6, N. Y.
Drinkwater, Inc., 2323 S. Michigan Ave., Chicago 16, Ill.
Drying Systems, Inc., 1812½ W. Foster Ave., Chicago 40, Ill.
Dry-Zero Corp., Merchandise Mart, Chicago 54, Ill.
Dual Air Fan Co., 711 W. Lake St., Chicago 6, Ill.
● Dudgeon, Inc., Richard, Columbia and Broome Sts., New York 2, N. Y.
● Dunham Co., C. A., 450 E. Ohio St., Chicago 11, Ill.
Dunn, Inc., Struthers, 1321 Arch St., Philadelphia 7, Pa.
du Pont de Nemours & Co., E. I., Ammonia Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Electrochemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., Inc., E. I., Fabrics & Finishes Dept., Wilmington 98, Del.
Durabla Mfg. Co., 114 Liberty St., New York 6, N. Y.
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.
Duraloy Co., Scottdale, Pa.
● Durant Insulated Pipe Co., 1015 Runnymede, East, Palo Alto, Calif.
Duriron Co., Inc., The, 450 N. Findlay St., Dayton 1, O.
Duro Co., 537 Monument Ave., Dayton, O.
Duro Metal Products Co., 2649 N. Kildare Ave., Chicago, Ill.
Dust Filter Co., 4418 N. Clark St., Chicago 40, Ill.
Dustlix Corp., 715 N. Van Buren St., Milwaukee, Wis.

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Dwyer Mfg. Co., F. W., 317 S. Western Ave., Chicago 12, Ill.
Dynamic Air Engineering, Inc., 1619 S. Alameda, Los Angeles 21, Calif.
Dzus Fastener Co., Inc., Babylon, N. Y.

• Eagan Co., Walter H., 2336-38 Fairmount Ave., Philadelphia 30, Pa.
Eagle-Picher Co., American Bldg., Cincinnati 1, O.
Eaglesfield Ventilator Co., 910-20 Dorman St., Indianapolis, Ind.
Eastern Air Devices, Inc., Sales and Engineering Offices, 130 Flatbush Ave., Brooklyn, N. Y.
Eastern Engineering Co., 45 Fox St., New Haven 6, Conn.
Eastern Foundry Co., Boyertown, Pa.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
Eastern Oil & Equipment Co., 27 Portland St., Portland 3, Me.
Eastern Stainless Steel Corp., P. O. Box 1975, Baltimore 3, Md.
Eastman Kodak Co., Kodak Park, Rochester 4, N. Y.
Eckhardt Mfg. Co., 123 Hawthorne St., Roselle Park, N. J.
Eclipse Air Brush Co., Inc., 381 Park Ave., Newark, N. J.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Econocol Stoker Div. of Cotta Transmission Co., 2340 11th St., Rockford, Ill.
Economy Equipment Co., 919 W. 49th Pl., Chicago 9, Ill.
Economy Pumps, Inc., 1000 Weller Ave., Hamilton, O.
Economy Valve Seat Co., 2807-13 Fletcher St., Chicago 18, Ill.
Eddy Stoker Corp., 4717 W. North Ave., Chicago 39, Ill.
Eddy Valve Co., Waterford, N. Y.
Edge Moor Iron Wks., Inc., Edge Moor 25, Del.
Edison General Electric Appliance Co., Inc., 5600 W. Taylor St., Chicago 44, Ill.
Edison, Inc., Thomas A., Instrument Div., Lakeside Ave., West Orange, N. J.
Edward Valves, Inc., 1200 W. 145th St., East Chicago, Ind.
Ehret Magnesia Co., Valley Forge, Pa.
Eiker Mfg. Co., Ogallala, Neb.
Eisler Engineering Corp., 754 S. 13th St., Newark 3, N. J.
Elastic Porcelain Lining Corp., 42 East Ave., Rochester 4, N. Y.
Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N. J.
Electric Arc, Inc., 152 Jelliff Ave., Newark 8, N. J.
Electric Auto-Lite Co., Instrument & Gauge Div., Caledonia and Gillette Sts., La Crosse, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, O.
Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis 13, Minn.
Electric Service Control, Inc., 205 N. 12th St., Newark 7, N. Y.
Electric Sprayit Co., The, 1415-25 Illinois Ave., Sheboygan, Wis.
Electric Steel Foundry Co., 2141 N. W. 25th St., Portland, Ore.
Electrimatic, 2100 Indiana Ave., Chicago 16, Ill.
Elecro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Electro Products Laboratories, Inc., 549 W. Randolph St., Chicago, Ill.
Electrol Burner Mfg. Co., Inc., 22 Union Ave., Rutherford, N. J.
Electromode Corp., Div. of American Foundry Equipment Co., 619 S. Byrkit St., Mishawaka, Ind.
Electro-Switch & Controls Co., 5607 W. Adams Blvd., Los Angeles 16, Calif.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago 7, Ill.
Elgin Softener Corp., Elgin, Ill.
Elgo Shutter & Mfg. Co., 6970 W. Jefferson Ave., Detroit 17, Mich.
Elliott Co., Jeannette, Pa.
Ellis Drier Co., 2444 N. Crawford Ave., Chicago 39, Ill.
Ellison Draft Gage Co., 214 W. Kinzie St., Chicago 10, Ill.
Ellsworth Pipe & Supply Co., 513 W. Traser St., Milwaukee 3, Wis.
Emerson Electric Mfg. Co., The, 8100 Florissant Ave., St. Louis 21, Mo.
Empire Sheet & Tin Plate Co., N. Bowman St., Mansfield, O.
Empire Ventilation Equipment Co., 35-39 Vernon Blvd., Long Island City 1, N. Y.
Endura Mfg. Corp., 45 N. 4th St., Quakerstown, Pa.
Engelhard, Inc., Charles, 90 Chestnut St., Newark, N. J.
Engineer Co., 75 West St., New York 6, N. Y.
• Enterprise Engine & Foundry Co., 2949 18th St, San Francisco 10, Calif.
Equipoise Controls, 100 Stevens Ave., Mount Vernon, N. Y.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Ergolyte Mfg. Co., 3627 Lawrence St., N., Philadelphia 40, Pa.
Erickson Specialty Co., 39 Mohawk St., Cohoes, N. Y.
Erie Bolt & Nut Co., Erie, Pa.
Erie City Iron Wks., 1450 East Ave., Erie, Pa.
Erie Tool Wks., 11th & French Sts., Erie 2, Pa.
Ess Instrument Co., 96 Washington Ave., Bergenfield, N. J.
Ess Specialty Corp., 96 S. Washington Ave., Bergenfield, N. J.
Essex Wire Corp., Div. of., 37 Manchester Ave., Detroit, Mich.
Essick Mfg. Co., 1950 Santa Fe Ave., Los Angeles 21, Calif.
Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.
Everhot Products Co., 2059 W. Carroll, Chicago 12, Ill.
Everite Pump & Mfg. Co., Inc., P. O. Box 1391, Lancaster, Pa.
Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J.
Excelsior Leather Washer Mfg. Co., 720-730 Chestnut St., Rockford, Ill.
Excelsior Steel Furnace Co., The, 118 S. Clinton St., Chicago 6, Ill.
Excelsior Tool & Machine Co., 31st & Ridge Ave., East St. Louis, Ill.
• Extended Surface, Div. of David E. Kennedy, Inc., 68 Second Ave., Brooklyn 15, N. Y.
Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn.

Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
Fairbanks Co., 393 Lafayette St., New York 3, N. Y.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.
Fairmont Aluminum Co., Fairmont, W. Va.
Falcon Equipment Co., 13th St., New Brighton, Pa.
Falstrom Co., Main Ave. & D. L. & W. R. R., Passaic, N. J.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Farquhar Co., A. B., Duke St., York, Pa.
Farr Co., 2615 Southwest Dr., Los Angeles 43, Calif.
Farrar & Trefts, 20 Milburn St., Buffalo 12, N. Y.
Farris Engineering Co., Palisades Park, N. J.
• Fedders-Quigan Corp., 57 Tonawanda St., Buffalo 7, N. Y.
Federal Machine & Welder Co., 212 Dana St., Warren, O.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Federated Metals Div., American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Fee and Stemwedel, Inc., 2210 Wabansia Ave., Chicago 47, Ill.
Felt Products Mfg. Co., 1514 Carroll Ave., Chicago 7, Ill.
Felters Company, The, 210 South St., Boston 11, Mass.
Fenwal, Inc., 200 Pleasant St., Ashland, Mass.
Ferguson & Lange Foundry Co., 1039 Willow St., Chicago, Ill.
Fern, Ralph, 2517 Boulevard Ave., Scranton 9, Pa.
Ferro-Nil Corp., 381 Fourth Ave., New York 16, N. Y.
Fibre Conduit Co., Orangeburg, N. Y.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Filtrine Mfg. Co., Inc., 53 Lexington Ave., Brooklyn 5, N. Y.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore 17, Md.
Finn Engineers, Inc., Jerry, Heating Div., 201 N. First National Bank Bldg., St. Paul 1, Minn.
Fire-King Stoker Co., 3760 E. St. Clair, Indianapolis, Ind.
Fireline Stove & Furnace Lining Co., 1800 Kingsbury St., Chicago 14, Ill.
Firemood Machine Wks., Converse, Ind.
Firestone Tire & Rubber Co., So. Main St., Akron, O.
Fir-Tex Insulating Board Co., St. Helens, Ore.
Fischer & Porter Co., 1 J-L, Hatboro, Pa.
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.
• Fisher Governor Co., 205 S. First Ave., Marshalltown, Ia.
• Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17, N. Y.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia 2, Pa.
Flemm Lead Co., Inc., Bradley Ave. & School St., Long Island City 1, N. Y.
Flexitallic Gasket Co., 8th & Bailey Sts., Camden, N. J.
Flexlock Corp., 411 E. Market St., Akron, O.
Flexo Supply Co., Inc., 4221 Olive St., St. Louis 8, Mo.
Flintkote Co., The, 30 Rockefeller Plaza, New York 20, N. Y.
Flori Pipe Co., The, 601 E. Red Bud Ave., St. Louis 15, Mo.
Floridin Co., Warren, Pa.
Flotrol Systems, Inc., 817 N. Lewis Pl., Tulsa, Okla.
Fluid Heat Div., Anchor Post Products, Inc., 6500 Eastern Ave., Baltimore 24, Md.
Fluor Corp., Ltd., The, 2500 S. Atlantic Blvd., Los Angeles 22, Calif.
Flynn & Emrich Co., 301 Holliday St., Baltimore 2, Md.
Follansbee Steel Corp., 3rd and Liberty Aves., Pittsburgh, Pa.
Ford Roofing Products Co., 111 W. Washington St., Chicago, Ill.
Forman Air Conditioning & Engrg. Co., 345 W. 40th St., New York 18, N. Y.
Fossum, M. H., 2086 Marshall Ave., St. Paul, Minn.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foster Pump Wks., Inc., 46-A Washington St., Brooklyn 1, N. Y.
Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.
Fowler & Wolfe Radiator Co., Oak and Carson Sts., Norristown, Pa.
Fox Control & Mfg. Co., 3589 E. 93rd St., Cleveland, O.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
France Packing Co., 6512 Tacony St., Tacony, Philadelphia 35, Pa.
Frank Heaters, Inc., 521 E. 40th St., Paterson 14, N. J.
Frederick Iron & Steel Co., E. 7th St., Frederick, Md.
Freed Products Co., 1510 Third Ave., Moline, Ill.
Freeman Stoker Div., Illinois Iron & Bolt Co., 918 S. Michigan Ave., Chicago 5, Ill.
Fresh-'nd-Aire Co., 221 N. LaSalle St., Chicago 1, Ill.
Fretz-Moon Tube Co., Inc., Butler, Pa.
Frick Co., Waynesboro, Pa.
Friez Instrument Div., Bendix Aviation Corp., Taylor Ave., Towson, Baltimore 4, Md.
Frigidaire Div., General Motors Corp., Dayton 1, O.
Frost Mfg. Co., S. Henderson St., Galesburg, Ill.
Fuel Savers, Inc., 15th and Herr Sts., Harrisburg, Pa.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Fuller Co., 124 Bridge St., Catasauqua, Pa.
• Fulton Sylphon Co., The, Box 400, Knoxville 4, Tenn.

G. D. S. Machinery & Supply Co., Inc., 101 Walker St., New York, N. Y.
G. M. Mfg. Co., 50 W. 3rd St., New York 12, N. Y.
G & O Mfg. Co., 138 Winchester Ave., New Haven 8, Conn.
Gallaher Co., The, Owatonna, Minn.
Galv-Weld Products, P. O. Box 37, Sta. D, Dayton 10, O.
Garden City Fan Co., 332 S. Michigan Ave., Chicago 4, Ill.
Gardiner Metal Co., 2514 W. 48th Pl., Chicago 32, Ill.
Gardner-Denver Co., Quincy, Ill.
Garlock Packing Co., 50 Main St., Palmyra, N. Y.
Gas & Oil Industry Laboratories, Inc., 4 Paine Ave., Irvington, N. J.
Gasflux Co., Mansfield, O.
Gates Engineering Co., P. O. Box 1711, Wilmington, Del.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Gatke Corp., 228 N. LaSalle St., Chicago, Ill.
• Gehl Bros. Mfg. Co., West Bend, Wis.
Gehri Co., 1117 Tacoma Ave., Tacoma 3, Wash.
• Gelert Co., C. R., 35 N. Raymond Ave., Pasadena 1, Calif.
General Blower Co., 8601 Ferris Ave., Morton Grove, Ill.
General Blower Co., Inc., 6137 Market St., Philadelphia 39, Pa.
General Ceramics Co., Keasbey, N. J.
• General Controls Co., 801 Allen Ave., Glendale 1, Calif.
General Corporation, 3353 University Ave., Minneapolis 14, Minn.
General Electric Co., Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.
General Electric Co., Apparatus Dept., 1 River Rd., Schenectady 5, N. Y.
General Electric Co., Chemical Dept., 1 Plastics Ave., Pittsfield, Mass.
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, O.
General Engineering & Mfg. Co., 4417 Oleatha St., St. Louis 16, Mo.
General Filters, Inc., 12890 Westwood, Detroit 23, Mich.
• General Fittings Co., 123 Georgia Ave., Providence 5, R. I.
General Furnaces Corp., 42 W. 2nd St., Oswego, N. Y.

• Advertisement in this issue. See Index to Advertisers, pages 343-344.

General Gas Light Co., 212 N. Park, Kalamazoo 11F, Mich.
General Insulating Products Co., 8821 15th Ave., Brooklyn, N. Y.
General Machinery Co., 3500 Riverside Ave., Spokane 1, Wash.
General Ozone Corp., 1455 W. Congress St., Chicago 7, Ill.
General Plate Div., Metals & Controls Corp., 34 Forest St., Attleboro, Mass.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
General Scientific Equipment Co., 1346 N. Somerset St., Philadelphia 32, Pa.
Genspring, Inc., 500 Fifth Ave., New York 18, N. Y.
Gerett Corp., M. A., 724 W. Winnebago St., Milwaukee 5, Wis.
Gerstein & Cooper Co., 1 W. Third St., South Boston 27, Mass.
Geuder, Paeschke & Frey Co., W. St. Paul Ave. and N. 15th St., Milwaukee, Wis.
Giannini Co., Inc., G. M., 161 E. California St., Pasadena, Calif.
Giant Mfg. Co., South Ave., Council Bluffs, Ia.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gillian Mfg. Co., 7752 Dubois St., Detroit 11, Mich.
Gilmer Company, L. H., Div. of United States Rubber Co., 7230 Keystone St., Tacony, Philadelphia 35, Pa.
Gisholt Machine Co., 1253 E. Washington Ave., Madison 3, Wis.
Glaser Lead Co., Inc., 31 Wyckoff Ave., Brooklyn, N. Y.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Glo Heat Equipment Co., 1951 Grand Central Terminal Bldg., New York 17, N. Y.
● Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Goese Mfg. Co., 2548 N. 18th St., Milwaukee 6, Wis.
Goethel Sheet Metal Wks., Alfred, 1910 N. Killian Pl., Mliwaukee, Wis.
Goettl Bros. Metal Prod. Co., Central Ave., Phoenix, Ariz.
Goetze Gasket & Packing Co., Inc., 60 Allen Ave., New Brunswick, N. J.
Golden-Anderson Valve Specialty Co., Fulton Bdg., Pittsburgh, Pa.
Goldens' Foundry & Machine Co., Columbus, Ga.
Goodrich Co., B. F., 548 S. Main St., Akron 18, O.
Goodyear Tire & Rubber Co., E. Market St., Akron 16, O.
Goodyer Industries, Inc., Railway Exchange Bldg., Rm. 316, Chicago, Ill.
Gorman-Rupp Co., Mansfield, O.
Gorton Heating Corp., Cranford, N. J.
● Gotham Instrument Co., Inc., 149 Wooster St., New York 17, N. Y.
Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y.
● Governair Corp., 513 N. Blackwelder St., P. O. Box 1654, Oklahoma City, 1, Okla.
Grabler Mfg. Co., 6565 Broadway, Cleveland 5, O.
Graham Mfg. Co., Inc., 415 Lexington Ave., New York 17, N. Y.
Graham Transmissions, Inc., 3754 N. Halton St., Milwaukee 12, Wis.
Grand Rapids Die & Tool Co., 1545 Madison S. E., Grand Rapids, Mich.
Granite City Steel Co., 20th & Madison Ave., Granite City, Ill.
● Grant Wilson, Inc., 141 W. Jackson Blvd., Chicago 4, Ill.
Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.
Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ind.
Gray Metal Products, Inc., 30 Carleton St., Rochester, N. Y.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Great National Air Conditioning Co., 2125 N. Harwood St., Dallas 1, Tex.
Green Fire Brick Co., A. P., Mexico, Mo.
Green Fuel Economizer Co., 700 Main St., Beacon, N. Y.
Greene, Tweed & Co., 238th St. & Bronx Blvd., New York 66, N. Y.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Greenlee Tool Co., Div. of Greenlee Bros. & Co., 2136 12th St., Rockford, Ill.
Greiner Co., Emil, 161 Sixth Ave., New York, N. Y.
Grief, Edward C., 64 West End Ave., Bogota, N. J.
Griffith Equipment Co., Inc., Los Angeles, Calif.
● Grinnell Co., Inc., 260 W. Exchange, Providence 1, R. I.
Griscom-Russell Co., The, 285 Madison Ave., New York 17, N. Y.
Grobet File Corp. of America, 421 Canal St., New York 13, N. Y.
Grossenbacher Furnace Co., 9416 W. Milton Ave., Overland 14, Mo.
Grove Regulator Co., 6529 Hollis St., Oakland, Calif.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill.
Guardian Products Corp., 215 E. Michigan St., Michigan City, Ind.
Guild & Garrison, Inc., 43 Keap St., Brooklyn 11, N. Y.
Gustin Bacon Mfg. Co., 1412 W. 12th St., Kansas City 7, Mo.
Gunnite Foundries Corp., 302 Peoples Ave., Rockford, Ill.
Guth Co., Edwin F., 2615 Washington Blvd., St. Louis 3, Mo.
Gylstrom Co., O., 108 W. Wells St., Milwaukee, Wis.

H. & A. Co., 86-100 Leroy Ave., Buffalo 14, N. Y.
H-B Instrument Co., 2518 N. Broad St., Philadelphia 32, Pa.
Haering & Co., Inc., D. W., 205 W. Wacker Dr., Chicago 6, Ill.
● Hagan Corp., Hagan Bldg., Pittsburgh 30, Pa.
Hague & Co., Alfred, 230 Thirty-fourth St., Brooklyn 32, N. Y.
● Haines & Co., William S., 12th & Buttonwood Sts., Philadelphia 23, Pa.
Halfco, Inc., 4059 Goodwin Ave., Los Angeles 26, Calif.
Halowax Products Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hamburg Boiler Wks., Inc., Grand St., Hamburg, Pa.
Hamer Oil Tool Co., 2919 Gardenia Ave., Long Beach 7, Calif.
Hamilton Rubber Mfg. Co., Mead St., Trenton, N. J.
Hammel-Dahl Co., 243 Richmond St., Providence 3, R. I.
Hammett Electric Mfg. Co., 706-708 E. 18th St., Kansas City 8, Mo.
Hammond Brass Wks., Summer Blvd., Hammond, Ind.
Hampton-Cross Co., The, 1014 W. Main St., Louisville, Ky.
Hampton Electric Mfg. Co., 1238 Voskamp St., Pittsburgh 12, Pa.
Handley Brown Heater Co., 209 E. Washington Ave., Jackson, Mich.
● Handy & Harman, 82 Fulton St., New York 7, N. Y.
● Hansen Mfg. Co., Inc., Princeton 6, Ind.
Hardinge Oil Burner & Mfg. Co., 1700 Berteau St., Chicago 13, Ill.
Hardy, Inc., Charles, 420 Lexington Ave., New York, N. Y.
Hare Engineering Co., 155 W. Congress St., Detroit 26, Mich.
Harman Equipment Co., 937 Santa Fe Ave., Los Angeles 21, Calif.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Harper Co., H. M., 2620 W. Fletcher, Chicago, Ill.
Harrington & King Perforating Co., 5655 Fillmore St., Chicago 44, Ill.
Harris, A. R., 4546 Hohman Ave., Hammond, Ind.
Harris Calorific Co, The, 5501 Cass Ave., N. W., Cleveland 2, O.
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago 7, Ill.
Harrisburg Machinery Corp., 7th & Curtin St., Harrisburg, Pa.
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa.
Harry Cooling Towers, Inc., 554 W. 48th St., New York 19, N. Y.
Hart & Cooley Mfg. Co., Holland, Mich.
Hart Mfg. Co., The, Hamilton St., Hartford 1, Conn.
Hartmann Co., Chas., 985 Dean St., Brooklyn, N. Y.
Hartwell Engineering Co., 3417 Cranshaw Blvd., Los Angeles 16, Calif.
Hartzell Propeller Fan Co., P. O. Box 909, Roosevelt Ave., Piqua, O.
Harvey, Inc., Sid, 108 E. Mineola Ave., Valley Stream, N. Y.
Harvey-Whipple, Inc., Springfield, Mass.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee 3, Wis.
Haskell Mfg. Co., Wm. H., 20 Commerce St., Pawtucket, R. I.
Hastings Air Conditioning Co., Box 481, 108 S. Colorado Ave., Hastings, Neb.
Haveg Corp., Newark, Del.
Hays Corp., 782 E. 8th St., Michigan City, Ind.
Hays Mfg. Co., 801 W. 12th St., Erie, Pa.
Healy Ruff Co., 2257 University Ave., St. Paul 4, Minn.
Heartley Machine & Tool Co., 900-8 Summit St., Toledo, O.
Heat Equipment Co., 7535 Cottage Grove Ave., Chicago, Ill.
Heat Timer Corp., 160 Fifth Ave., New York 10, N. Y.
Heat Transfer Products, Inc., P. O. Box 516, Carbondale, Pa.
Heating Assurance, Inc., 124 E. Augusta St., Spokane 13, Wash.
Hegeler Zinc Co., P. O. Box 599, Danville, Ill.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.
Hendley & Whittemore, 6 Blackhawk Blvd., Beloit, Wis.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
● Henry Co., Paul, The, Controls Div., 2037 S. LaCienega Blvd., Los Angeles 34, Calif.
Henry Furnace Co., The, Medina, O.
● Henry Valve Co., 3260 W. Grand Ave., Chicago 51, Ill.
Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.
Herbert Boiler Co., 2300 Blomingdale Ave., Chicago, Ill.
Her-Born Engineering & Mfg. Co., 212 Columbus Ave., Sandusky, O.
Herbusch Corp., The, 706 Chestnut St., 210 Title Guaranty Bldg., St. Louis 1, Mo.
Hercules Chemical Co., Inc., 332 Canal St., New York 13, N. Y.
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.
Hercules Float Wks., 200 Franklin St., Springfield, Mass.
Hersey Mfg. Co., South Boston, Mass.
Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Hertner Co., Inc., 12690 Elmwood Ave., Cleveland, O.
Hess Warming & Ventilating Co., 1211 S. Western Ave., Chicago, Ill.
Hetzel Roofing Products Co., 67 Maine St., Newark 5, N. J.
Highside Chemicals Co., 195 Verona Ave., Newark 4, N. J.
Hill Diesel Engine Co., Lansing 3, Mich.
Hill, E. Vernon, 6826 W. Highland Ave., Chicago 31, Ill.
Hilo Varnish Corp., 55 Stewart Ave., Brooklyn 6, N. Y.
Hinde & Dauch Paper Co., P. O. Box 861, Sandusky, O.
Hirschman-Pohle Co., Inc., 12 Lent Ave., LeRoy, N. Y.
Hobart Bros., Co., Troy 1, O.
Hodge Boiler Wks., 99-111 Sumner St., East Boston 28, Mass.
Hodgman Mfg. Co., 135 Washington St., Taunton, Mass.
Hoffman Combustion Engineering Co., 710 Marquette Bldg., Detroit, Mich.
● Hoffman Specialty Co., 1001 York St., Indianapolis 7, Ind.
Holby Valve Co., 1146 Second Ave., New York 21, N. Y.
Holcomb & Hoke Mfg. Co., 1545 Van Buren, Indianapolis 7, Ind.
Hollands Mfg. Co., Erie, Pa.
Hollup Corp., Div. of National Cylinder Gas Co., 4700 W. 19th St., Chicago 50, Ill.
Holsclaw Bros. Inc., Evansville 11, Ind.
Holtum Mfg. Co., Freeport, Ill.
Holtzer-Cabot, Div. First Industrial Corp., 125 Armory St., Boston 19, Mass.
Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa.
Hood Refining Co., 182 N. Hamilton Ave., Greensburg, Pa.
Hoppes Mfg. Co., 850 N. Belmont Ave., N. Springfield, O.
Horn Co., A. C., 43-36 Tenth St., Long Island City, N. Y.
Horton Mfg. Co., 3016 University Ave., S. E., Minneapolis 14, Minn.
Hossfeld Mfg. Co., 460 W. Third St., Winona, Minn.
Hotstream Heater Co., 2363 E. 69th St., Cleveland 4, O.
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Howard Iron Wks. & Alberger Heater Co., 287 Chicago St., Buffalo 4, N. Y.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago 18, Ill.
Howell Electric Motors Co., Howell, Mich.
Howes-Woods Co., 201 Bridge St., Cambridge, Mass.
Howry-Berg Steel & Iron Works, 2949 N. Spear Blvd., Denver 11, Colo.
Hubbard Co., 1014 Marquette Ave., Minneapolis, Minn.
Hubbell Corp., 319 N. Albany Ave., Chicago 12, Ill.
Humboldt Mfg. Co., 2016 N. Whipple St., Chicago, Ill.
Hunt & Son, C. B., Inc., Salem, O.
Hunter Fan & Ventilating Co., Inc., 400 S. Front St., Memphis, Tenn.
Hupp Corp., Globe Stamping Div., 1250 W. 76th St., Cleveland 2, O.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh 19, Pa.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia 8, Pa.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Hydro-Aire, 626 N. Robertson Blvd., Los Angeles 46, Calif.
Hynes Electric Heating Co., West and Clinton Sts., Camden, N. J.

Ice-Air Conditioning Co., Inc., 794-6 Union St., Brooklyn 15, N. Y.
Ice Cooling Appliance Corp., Morrison, Ill.
Ideal Electric & Mfg. Co., E. First & Oak Sts., Mansfield, O.
Ideal Industries, Inc., 1096 Parke Ave., Sycamore, Ill.
● Ilg Electric Ventilating Co., 2841 N. Crawford Ave., Chicago 41, Ill.

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• Illinois Engineering Co., 2035 S. Racine Ave., Chicago 8, Ill.
Illinois Malleable Iron Co., 1801 Diversey Parkway, Chicago 14, Ill.
Illinois Oil Co., 4th Ave. and 24th St., Rock Island, Ill.
• Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill.
Illinois Zinc Co., 2959 W. 47th St., Chicago 32, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.
Imperial Electric Co., 64 Ira Ave., Akron, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.
Independent Register Co., 3747 E. 93rd St., Cleveland 5, O.
Indiana Fan Company, 427 S. Alabama St., Indianapolis 4, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
Industrial Engineering & Equipment Co., 711 S. Theresa Ave., St. Louis 3, Mo.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago 13, Ill.
Industrial Research, Lansdowne, Pa.
Industrial Screw Co., 711 W. Lake St., Chicago 6, Ill.
Industrial Service Laboratories, 7656 W. Forest Home Ave., Milwaukee, 14, Wis.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Inner-Tite Div. of Yara Engineering Corp., 18 W. Jersey St., Elizabeth 4, N. J.
Instant Drying Corp., 101 Park Ave., New York, N. Y.
Insto-Gas Corp., 1977 E. Woodbridge St., Detroit 7, Mich.
Instrument Associates, Inc., 134 Broadway, Brooklyn 11, N. Y.
Insulite Div. Minnesota and Ontario Paper Co., 500 Baker Arcade Bldg., Minneapolis 2, Minn.
Insul-Wool Insulation Corp., Wichita 12, Kans.
Inter-Coastal Paint Corp., 13th St. and Southern R. R., East St. Louis, Ill.
International Boiler Works, East Stroudsburg, Pa.
International Correspondence Schools, Scranton, Pa.
International Engineering, Inc., 1145 Bolander Ave., Dayton 1, O.
International Engineering Wks., Inc., Box 71, Framingham, Mass.
International Heater Co., 101 Park Ave., Utica 2, N. Y.
International Moistening Co., 489 S. Main St., Providence, R. I.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
International Nutyp Tool Co., 68 W. First St., Oswego, N. Y.
International Register Co., 2620 W. Washington Blvd., Chicago 12, Ill.
International Sales Co., 2045 Evans Ave., San Francisco 24, Calif.
International Steel Co., 1545 Edgar St., Evansville, Ind.
International Vermiculite Co., Girard, Ill.
Interstate Sales Co., 1121 Broadway, New York 10, N. Y.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia 32, Pa.
Iowa Paint Mfg. Co., 118-20 Eighth St., Des Moines, Ia.
• Iron Fireman Mfg. Co., 3085 W. 106 St., Cleveland 11, O.
Irving Flexible Coupling Co., Inc., 1516 W. Slauson Ave., Los Angeles 44, Calif.
Irvington Varnish and Insulator Co., 6 Argyle Terrace, Irvington 11, N. J.
Iwan Brothers, Inc., 1503 Prairie Ave., South Bend 14, Ind.

J O Mfg. Co., 8442 Otis St., South Gate, Calif.
Jabsco Pump Co., 2031 Lincoln St., Burbank, Calif.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Jackson Co., Byron, P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif.
• Jackson & Church Co., 321 N. Hamilton Ave., Saginaw 65, Mich.
Jacobs Co., B. & J., 1729 John St., Cincinnati 14, O.
Jacuzzi Bros., Inc., 5327 Jacuzzi Ave., Richmond, Calif.
Jaden Mfg. Co., 1601 Second St., Hastings, Neb.
Jamar Co., Walker, 367 S. First Ave., E. Duluth, Minn.
Jamieson Mfg. Co., 819 Bedford, Dallas, Tex.
Janette Mfg. Co., 556 W. Monroe St., Chicago 6, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
• Jefferson Union Co., 601 W. 26th St., New York 1, N. Y.
Jeffrey Mfg. Co., 859-99 N. Fourth St., Columbus 16, O.
• Jenkins Bros., 80 White St., New York 13, N. Y.
Jennison Co., 17 Putnam St., Fitchburg, Mass.
Jessop Steel Co., Washington, Pa.
Jewel Mfg. Co., 1841 University Ave., St. Paul 4, Minn.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Johnson Bronze Co., 460 S. Mill St., New Castle, Pa.
Johnson Co., Lloyd S., 2241 Indiana Ave., Chicago 16, Ill.
Johnson Co., S. T., 940 Arlington St., Oakland 8, Calif.; 401 N. Broad St., Philadelphia 8, Pa.
• Johnson Corp., 806 Wood St., Three Rivers, Mich.
Johnson Fan & Blower Corp., 1319 W. Lake St., Chicago 7, Ill.
Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Ia.
• Johnson Service Co., 507 E. Michigan St., Milwaukee 2, Wis.
Johnston Bros., Inc., Ferrysburg, Mich.
Johnston & Chapman Co., 2925 Carroll Ave., Chicago 12, Ill.
Johnston Co., William W., 115 Bayard St., Dayton, O.
Johnston & Jennings, 877 Addison Rd., Cleveland 14, O.
Johnston Tin Foil & Metal Co., The, 6100 S. Broadway, St. Louis 11, Mo.
Joliet Chemicals, Inc., Industry Ave., Joliet, Ill.
Jones Foundry & Machine Co., W. A., 4401 Roosevelt Rd., Chicago 24, Ill.
Jones & Laughlin Steel Corp., Third Ave. & Ross St., Pittsburgh 30, Pa.
Jordan & Co., Inc., Paul R., 311 E. South St., Indianapolis 4, Ind.
Joy Mfg. Co., Sullivan Div., Michigan City, Ind.
Justus Steam Trap Co., Napanoch, N. Y.

Kainer & Co., 763 W. Lexington St., Chicago 7, Ill.
Kaiser Co., E. B., 625 Webster Ave., Chicago 14, Ill.
Kaiser Co., H. S., 3336 Franklin Blvd., Chicago, Ill.
Kaltenthaler Co., H. J., 236 Cherry St., Philadelphia 6, Pa.
Kane Mfg. Corp., Kane, Pa.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis 8, Mo.
Kaufman Co., H. J., The, 13215 Roselawn Ave., Detroit 4, Mich.
Kaye & MacDonald, Inc., 88-96 Franklin Ave., West Orange, N. J.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Keckley Co., O. C., 400 W. Madison St., Chicago 6, Ill.
Keeler Co., E., 238 West St., Williamsport 3, Pa.
Keeney Mfg. Co., Main St., Newington 11, Conn.
Kehm Corp., The, 135 S. La Salle St., Chicago 3, Ill.
Keldur Corp., 420 Lexington Ave., New York 17, N. Y.
Keller Tool Co., P. O. Box 268, Grand Haven, Mich.
Kellogg Co., M. W., The, 225 Broadway, New York 7, N. Y.
Kelly-Koet, Covington, Ky.
Kelvin-White Co., 90 State St., Boston 9, Mass.
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit 32, Mich.
• Kennard Corp., 2019 S. Hanley Rd., St. Louis 17, Mo.
Kennedy, Inc., David E., 60 Second Ave., Brooklyn, N. Y.
• Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kerentoff, G. L., 2218 Reading Rd., Cincinnati 2, O.
Kernchen Co., 103 E. Wacker Drive, Chicago, Ill.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh 22, Pa.
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.
• Kewanee Boiler Corp., Franklin St. and "Q" Tracks, Kewanee, Ill.
• Key Co., 2661 McCasland, East St. Louis, Ill.
Keystone Asphalt Products Co., 43 E. Ohio St., Chicago 11, Ill.
Keystone Carbon Co., Inc., St. Marys, Pa.
Kidder Mfg. Co., Inc., J. F., 426 Colchester Ave., Burlington, Vt.
• Kieley & Mueller, Inc., 2015 43rd St., North Bergen, N. J.
Kimberly-Clark Corp., Neenah, Wis.
• Kinetic Chemicals, Inc., 10th & Market Sts., Wilmington 98, Del.
King Co., The, Box 178, Owatonna, Minn.
King Engineering Corp., 945 Willard Ave., Ann Arbor, Mich.
King Gauge & Mfg. Co., 114 Wallace St., New Haven, Conn.
King Union Co., Inc., Hillsgrove, R. I.
Kingsford Foundry & Machine Wks., 264 W. Second St., Oswego, N. Y.
Kingston Products Corp., 1415 N. Webster, Kokomo, Ind.
Kinney Mfg. Co., 3529 Washington St., Boston 30, Mass.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Kisco Boiler & Engineering Co., 3732-40 Chouteau Ave., St. Louis 10, Mo.
Kitson Co., 1500 Walnut St., Philadelphia 2, Pa.
Klauer Mfg. Co., 9th and Washington Sts., Dubuque, Ia.
Klee Co., Geo. B., 3501-27 Colerain Ave., Cincinnati 23, O.
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis.
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago 12, Ill.
Klenk's Aviation Snips, 107 E. 5th St., Wilmington, Del.
Klingerit, Inc., 16-22 Hudson St., New York 13, N. Y.
Klipfel Mfg. Co., 1000 Weiler Ave., Hamilton, O.
Klomparens Lock-Joint Mfg. Co., Inc., 4600 Bowen Rd., S. E., Washington 19, D. C.
Kluegel & Co., E., 187 W. Kellogg Blvd., St. Paul, Minn.
Knickerbocker Co., 603 Liberty St., Jackson, Mich.
Knight, Maurice A, Kelly Ave., Akron 9, O.
Knowles Mushroom Ventilator Co., 583 Upper Mountain Ave., Upper Montclair, N. J.
Kohler Co., P. O. Box A, Kohler, Wis.
Kol-Master Corp., 161 Walberg St., Oregon, Ill.
Kopperman & Sons, Joseph, 316 New St., Philadelphia 6, Pa.
Koppers Co., Bartlett Hayward Div., 200 Scott St., Baltimore 3, Md.
• Korfund Co., Inc., 48-36 32nd Pl., Long Island City 1, N. Y.
Koven & Bro., L. O., Inc., 154 Ogden Ave., Jersey City 7, N. J.
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J.
Kramer Trenton Co., N. Olden & Bruening Aves., Trenton 5, N. J.
Krehbiel Co., J. H., 425 N. Crawford Ave., Chicago, Ill.
Kresno-Stamm Mfg. Co., 730 Sixth Ave., New York 10, N. Y.
Krez Co., Paul J., 444 N. LaSalle St., Chicago, Ill.
• Krueger Sentry Gauge Co., 1056 W. Mason St., Green Bay, Wis.
• Kuhns Bros. Co., Dayton 1, O.
Kunkle Valve Co., 121 S. Clinton St., Ft. Wayne 2, Ind.
Kwikon Co., 626 W. Jackson Blvd., Chicago, Ill.

L-R Mfg. Co., Blower Div., Torrington, Conn.
La Bour Co., Inc., The, 1301 Sterling Ave., Elkhart, Ind.
Laclede-Christy Clay Products Co., 411 N. Seventh St., St. Louis 1, Mo.
Laclede Steel Co., Arcade Bldg., Rm. 1317, St. Louis 1, Mo.
LaClede Stoker Co., 4438 Hunt Ave., St. Louis 10, Mo.
La Crosse Steel Roofing & Corrugating Co., 227 Jay St., La Crosse, Wis.
La Crosse Tractor Co., La Crosse, Wis.
La-Del Div.—Joy Mfg. Co., S. Broadway and Mill Ave., New Philadelphia, O.
Ladish Drop Forge Co., Fittings Div., 5300 S. Packard Ave., Cudahy, Wis. (Milwaukee Suburb).
Lake Chemical Co., 607 N. Western Ave., Chicago 12, Ill.
Lamb & Ritchie Co., 250 Albany St., Cambridge, Mass.
Lammert & Mann Co., 221 N. Wood St., Chicago 12, Ill.
Lamson & Sessions Co., 1971 W. 85th St., Cleveland, O.
Landis & Gyr, Inc., 104 Fifth Ave., New York 11, N. Y.
Landis Machine, Inc., Fifth and Church Sts., Waynesboro, Pa.
Larkin Coils, 519 Memorial Dr., S. E., Atlanta 1, Ga.
Larkin Packer Co., 6200 Maple Ave., St. Louis 14, Mo.
Lastik Products Co., Inc., 1106 Keenan Bldg., Pittsburgh 22, Pa.
• Lau Blower Co., 2001 Home Ave., Dayton 7, O.
Lawler Automatic Controls, 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.
Layne & Bowler, Inc., Box No. 215, Hollywood Sta., Memphis 8, Tenn.
Leach Relay Co., 5919 Avalon Blvd., Los Angeles 3, Calif.
Lead Lined Iron Pipe Co., 1 Broadway, Wakefield, Mass.
Leavitt Machine Co., East River St., Orange, Mass.
Lecourtenay Co., 5 Maine St., Newark 5, N. J.
Lee Co., K. O., Aberdeen, S. D.
Lee Engineering Co., Union National Bank Bldg., Youngstown 3, O.
Lee & Son, Thomas, 128-132 W. Second St., Cincinnati 2, O.

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Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.
Lees, John, Div., Serrick Corp., Muncie, Ind.
Leffel & Co., James, 426 East St., Springfield, O.
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.
Lehigh Foundries, Inc., Refrigeration Div., Lancaster, Pa.
Lehon Co., The, 4411 S. Oakley Ave., Chicago, Ill.
Leinweber Propellers, 8448 Crandon, Chicago, Ill.
Leland Electric Co., 1501 Webster St., Dayton 1, O.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y., and Columbus, Ohio.
Leonard Precision Products Co., 1100 Larson Ave., Garden Grove, Calif.
Leonard Valve Co., Elmwood Station, Providence 7, R. I.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Leslie Welding Co., 2943 Carroll Ave., Chicago 12, Ill.
Levow, David, 308 W. 20th St., New York 11, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
● Lewin-Mathes Co., Lewin Metals Div., 1111 Chouteau Ave., St. Louis 2, Mo.
Lewis & Co., Inc., Chas. S., 2207 Pine St., St. Louis 3, Mo.
Lewis Laboratories, Inc., Paul, 924 N. Fourth St., Milwaukee 3, Wis.
Leyman Mfg. Corp., John H. McGowan Co. Div., 1416 First National Bank Bldg., Cincinnati 2, O.
Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo 3, O.
● Lilie-Hoffman Cooling Towers, Inc., 4239 Duncan Ave., St. Louis 10, Mo.
Lincoln Electric Co., The, 12818 Coit Rd., Cleveland 1, O.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Lindsay Corp., The, 1740 25th Ave., Melrose Park, Ill.
Linear Incorporated, N. W. Cor. State Rd. & Levick St., Philadelphia 35, Pa.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1; 300 W. Pershing Rd., Chicago 9, and 2410 W. 18th St., Chicago 8, Ill.; 519 N. Holmes Ave. and 220 S. Belmont Ave., Indianapolis 6, Ind., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.
Lintern Co., 60 Lincoln Ave., Berea, O.
Lion Mfg. Corp., 2701-11 Belmont Ave., Chicago, Ill.
Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23, Ill.
Liquid Conditioning Corp., 423 W. 126th St., New York 27, N. Y.
Liquidometer Corp., 37-15 Skillman Ave., Long Island City 1, N. Y.
Lissberger & Son, Inc., Marks, 23-01 Borden Ave., Long Island City, N. Y.
Lithgow Corp., 333 W. 40th Pl., Chicago, Ill.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford 6, Conn.
Littleford Bros., Inc., 453 E. Pearl St., Cincinnati 2, O.
Livingstone & Co., 89 Broad St., Boston, Mass.
Locke Regulator Co., Walter and Osborne Sts., Salem, Mass.
Lockformer Co., The, 4615 Arthington St., Chicago, Ill.
Lockjoint Wood Products Co., 1721 Mildred St., Wichita 7, Kan.
Locknut Corp. of America, 3403 W. 47th St., Chicago 32, Ill.
Lodge & Shipley Machine Tool Co., 805 Evans St., Cincinnati 4, O.
Logan Engineering Co., Lawrence & Lamon Ave., Chicago 30, Ill.
Loline Steel Boiler Co., 235 Penn St., Allentown, Pa.
Lonergan Co., J. E., 2nd and Race Sts., Philadelphia 6, Pa.
Lonergan Mfg. Co., Albion, Mich.
Long Mfg., Div. Borg-Warner Corp., 12501 Dequindre St., Detroit, Mich.
Lookout Boiler & Mfg. Co., Congress St. & Mfrs. Rd., Chattanooga 1, Tenn.
Lord Mfg. Co., 1633 W. 12th St., Erie, Pa.
Louisville Drying Machinery Co., 351 Baxter Ave., Louisville, Ky.
Lovejoy Flexible Coupling Co., 5024 W. Lake St., Chicago 44, Ill.
Lowell Wrench Co., 54 Commercial St., Worcester 8, Mass.
Loyal Knight Stokers, Inc., 800 Scheel St., Belleville, Ill.
Ludlow Valve Mfg. Co., Inc., Foot of Adams St., Troy, N. Y.
Lukens Steel Co. and Subsidiaries, 308 S. First Ave., Coatesville, Pa.
Lumm Co., A. H., 2512 Albion St., Toledo 6, O.
Lumsden & Van Stone, Div. of Midwest Piping & Supply Co., 426 First St., South Boston 27, Mass.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati 14, O.
Luzerne Rubber Co., Muirhead Ave., Trenton 9, N. J.
Lynch Mfg. Corp., 3600 Summit St., Toledo 1, O.
Lynchburg Foundry Co., Peoples Bank Bldg., Lynchburg, Va.
Lyon, Conklin & Co., Inc., McComas & Race Sts., Baltimore 30, Md.

M B Mfg. Co., Inc., The, 1060 State St., New Haven 11, Conn.
Maas & Waldstein Co., 438 Riverside Ave., Newark 4, N. J.
Machine-Craft Mfg. Co., 3805 Avalon Blvd., Los Angeles, Calif.
MacDermid Chemical Co., Bristol, Conn.
Macksons Co., 125 Cedar St., New York 6, N. Y.
MacLean-Fogg Lock Nut Co., 2653 N. Kildare, Chicago 39, Ill.
● MacMillan Co., The, 60 Fifth Ave., New York 11, N. Y.
Magirl Foundry & Furnace Wks., P. H., 413 E. Oakland Ave., Bloomington, Ill.
Magnetrol, Inc., 2110 S. Marshall Blvd., Chicago 23, Ill.
MagniLastic Div., Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit, Mich.
● Maid-O'-Mist, Inc., 3215 N. Pulaski Rd., Chicago 41, Ill.
Maintenance Engineering Corp., 3611 Clinton Dr., Houston, Tex.
Majestic Co., 733 Erie St., Huntington, Ind.
Majot Automatic Machine Co., Inc., 88 Main St., East Orange, N. J.
Mall Tool Co., 7740 S. South Chicago Ave., Chicago 19, Ill.
Malleable Iron Fittings Co., Branford, Conn.
Mallory Sales Co., 13904 Lincoln Ave., Dolton, Ill.
Manhattan Perforated Metal Co., Inc., 43-17 37th St., Long Island City 1, N. Y.
Manheim Mfg. & Belting Co., Manheim, Pa.
Manitowoc Boiler Wks., 16th & The River, Manitowoc, Wis.
Manning, Maxwell & Moore, Inc., Bridgeport 2, Conn.
Mansfield & Green, 1071 Power Ave., Cleveland 14, O.
Manufacturers Fin Coil Co., 2505 S. Pulaski Rd., Chicago 23, Ill.
Manufacturers Machine Co., Railroad Ave., North Andover, Mass.
Maplewood Machinery Co., Inc., 2634 Fullerton Ave., Chicago 47, Ill.
Marathon Electric Mfg. Corp., Cherry and Randolph Sts., P. O. Box 298, Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Marcliff, Inc., 1702 Summit St., Toledo, O.
Marco Co., 300 Church St., Wilmington, Del.
Marine Mfg. Co., 1761 North Park Ave., Chicago, Ill.
Marion Machine Foundry & Supply Co., Marion, Ind.
Marley Co., Inc., The, 3001 Fairfax Rd., Kansas City 15, Kans.
Marlin-Rockwell Corp., Jamestown, N. Y.
● Marlo Coil Co., 6135 Manchester Ave., St. Louis 10, Mo.
Marman Products Co., Inc., 940 W. Redondo Blvd., Inglewood, Calif.
Marquette Mfg. Co., 401 Johnson St., Minneapolis, Minn.
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago 14, Ill.
Marsh Heating Equipment Co., Div. of Jas. P. Marsh Corp., 2120 Southport Ave., Chicago 14, Ill.
Marsh Valve Co., 4th St., & Brigham Rd., Dunkirk, N. Y.
Marshalltown Mfg. Co., 901 E. Nevada, Marshalltown, Ia.
Martens & Stormoen, 15 Hathaway St., Boston 10, Mass.
Martin, J. O. & C. U., 637 Minna St., San Francisco, Calif.
Martin Fan & Blower Co., 4634 W. 21st Pl., Chicago 50, Ill.
Martin & Sons, H. P., 801 W. 12th St., Owensboro, Ky.
● Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia 7, Pa.
Masonite Corp., 111 W. Washington St., Chicago 2, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston 24, Mass.
Master Electric Co., 126 Davis Ave., Dayton 1, O.
Master Electric Co., Aircraft & Electrical Controls Div., 100 Davis Ave., Dayton 1, O.
Master Fan Corp., 1323 Channing, Los Angeles 21, Calif.
Matthiessen & Hegeler Zinc Co., 9th & Sterling Sts., La Salle, Ill.
Maurath, Inc., 7309 Union Ave., Cleveland, O.
Maurey Mfg. Corp., 2915 S. Wabash Ave., Chicago 16, Ill.
May Oil Burner Div., Gerotor May Corp., Maryland Ave. and Oliver, Baltimore 3, Md.
Mayflower Air-Conditioners, Inc., 5th Floor, Finch Ind. Bldg., St. Paul, Minn.
Mayne Products Co., 324 Harries Bldg., Dayton 2, O.
Mayson Mfg. Co., Inc., 4332 Horatio St., Detroit 10, Mich.
Maysteel Products, Inc., 135 W. Wells St., Milwaukee 3, Wis.
● McAlear Mfg. Div. of Climax Industries, Inc., 1921 S. Western Ave., Chicago 8, Ill.
McAuley Trap Co., 405 Penn Ave., Pittsburgh 22, Pa.
McCann Furnace Co., 5005 Euclid Ave., Cleveland 3, O.
● McCord Corp., 2587 E. Grand Blvd., Detroit 11, Mich.
McCorkle Co., D. H., 6th & Bancroft Way, Berkeley 2, Calif.
● McDonnell & Miller, Inc., Wrigley Bldg., 400 N. Michigan Ave., Chicago 11, Ill.
McIntyre Co., The, 15 Riverdale Ave., Newton 58, Mass.
McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.
McLeod & Henry Co., Inc., Troy, N. Y.
McPherson Furnace & Supply Co., 1805 N. E. Second Ave., Portland 12, Ore.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis 13, Minn.
McQuay-Norris Mfg. Co., Southwest Ave. at Marconi, St. Louis 10, Mo.
McWane Cast Iron Pipe Co., 1201 Vanderbilt Rd., Birmingham 2, Ala.
Mears-Kane-Ofeldt, Inc., 1903-1915 E. Hagert St., Philadelphia 25, Pa.
Mechanical Industries Production Co., 217-223 Ash St., Akron 3, O.
Medart Co., 3500 DeKalb, St. Louis, Mo.
● Meier Co., Joshua, 36 E. 10th St., New York, N. Y.
Meier Electric & Machine Co., Inc., 3525 E. Washington St., Indianapolis 7, Ind.
Meletron Corp., 950 N. Highland Ave., Los Angeles 38, Calif.
Mel-Gauge Co., Crest Ave., East Haven, Conn.
Mellish & Murray Co., 1715 Carroll Ave., Chicago 12, Ill.
Merchant & Evans Co., 2035 Washington Ave., Philadelphia 46, Pa.
● Mercoid Corp., The, 4201 Belmont Ave., Chicago 41, Ill.
Merco-Nordstrom Valve Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.
Mercury Clutch Corp., Canton 6, O.
Meriam Instrument Co., The, 10920 Madison Ave., Cleveland 2, O.
Mesker & Co., Geo. L., 400 N. W. First St., Evansville 8, Ind.
Metal & Thermit Corp. 120 Broadway, New York 5, N. Y.
Metallo Gasket Co., 16 Bethany St., New Brunswick, N. J.
Metropolitan Refining Co., Inc., 50-23 Twenty-Third St., Long Island City 1, N. Y.
● Mettler Co., Lee B., 406 S. Main St., Los Angeles 13, Calif.
Meyer & Bro. Co., F., 1313 S. Adams St., Peoria 2, Ill.
Meyer Furnace Co. The, Peoria 2, Ill.
Meyer Mfg. Co., 2536 Fourteenth St., Detroit 16, Mich.
Micheli Air Conditioning Co., Inc., 1725 State St., Schenectady, N. Y.
Michigan Pipe Co., 506 Phoenix Bldg., Bay City, Mich.
Micro Products Co., 20 N. Wacker Dr., Chicago 6, Ill.
Mirco Switch Div. of First Industrial Corp., 1 E. Spring St., Freeport, Ill.
● Mid-Continent Metal Products Co., 1960 Clybourn Ave., Chicago 14, Ill.
Middleton Mfg. & Sales Co., 125 N. 1st St., Minneapolis 6, Minn.
Midland Paint & Varnish Co., 9115 Reno Ave., Cleveland, O.
Mid-States Equipment Co., 2429 S. Michigan Ave., Chicago 16, Ill.
● Midwest Piping & Supply Co., Inc., 1450 S. Second St., St. Louis 4, Mo.
Midwest Products Co., Port Byron, Ill.
Milcor Steel Co., S., 4101 W. Burnham St., Milwaukee 4, Wis.
Miller Electric Mfg. Co., Inc., 718 S. Bounds St., Appleton, Wis.
Miller Heat-O-Meter Co., 1434 W. Atkinson Ave., Milwaukee 6, Wis.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Mills Corp., Elmer E., 153-159 W. Huron St., Chicago 10, Ill.
Mills Industries, Inc., 4110 W. Fullerton Ave., Chicago, Ill.
Milwaukee Gas Specialty Co., P. O. Box 461, Milwaukee, Wis.
● Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee 7, Wis.
Mineral Insulation Co., 103rd & Southwest Highway, Chicago Ridge, Ill.
● Minerallac Electric Co., 25 N. Peoria St., Chicago 7, Ill.
● Minneapolis-Honeywell Regulator Co., 2604 4th Ave., S., Minneapolis 8, Minn.
Minn-Kota Foundry & Mfg. Co., P. O. Box 822, Fargo, N. D.
Miracle Adhesives Corp., 852 Clinton Ave., Newark 8, N. J.

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Mir-O-Col Alloy Co., 2416 E. 53rd St., Los Angeles 11, Calif.
Misener Mfg. Co., Inc., 326 E. Washington St., Syracuse 2, N. Y.
Mission Appliance Corp., 7101 McKinley Ave., Los Angeles 1, Calif.
Mississippi Glass Co., 200 Fifth Ave., New York 10, N. Y.
Mitchell & Co., Inc., W. K., 29th & Ellsworth, Philadelphia 46, Pa.
Modern Engineering Co. 3411 Pine Blvd., St. Louis 3, Mo.
Modine Mfg. Co., 1772 Racine St., Racine, Wis.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill 18, N. Y.
Moeschl-Edwards Corrugating Co., Inc., The, P. O. Box 1115, Cincinnati 1, O.
Moloch Foundry & Machine Co., Kaukauna, Wis.
Monarch Mfg. Works, Inc., Salmon & Westmoreland Sts., Philadelphia 34, Pa.
Monash-Younker Co., Inc., 1315 W. Congress St., Chicago 7, Ill.
Moncrief Furnace Co., P. O. Box 1673, Atlanta 1, Ga.
Monitor Controller Co., The, 51 S. Gay St., Baltimore 2, Md.
Monogram Combustion Chamber Co., 731 N. 35th St., Philadelphia 4, Pa.
Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.
Monsanto Chemical Co., Merimac Div., Everett Sta., Boston 49, Mass.
Montag Stove & Furnace Wks., 2011 N. Columbia Blvd., Portland 3, Ore.
Montgomery Bros., 1122 Howard St., San Francisco, Calif.
Moore Co., Goodloe E., 603 N. Gilbert St., Danville, Ill.
Moore Co., The, 544 Westport Rd., Kansas City, Mo.
Moore Products Co., H and Lycoming Sts., Philadelphia 24, Pa.
Moore Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
Moraine Products Div., General Motors Corp., Dayton 1, O.
Moran Flexible Joint Co., 217 W. Main St., Louisville, Ky.
Morehead Mfg. Co., 2455 W. Warren Ave,. Detroit 8, Mich.
Morey, Dan, 814-816 S. Robertson Blvd., Los Angeles 35, Calif.
Morf Industries, Inc., 780 Manor Rd., Staten Island 2, N. Y.
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y.
Morrison Products, Inc., E. 168th St. and Waterloo Rd., Cleveland 10, O.
Morse Chain Co., Turner Pl., Ithaca, N. Y.
Morse-Smith-Morse, Inc., 165 Dexter Ave., Watertown 72, Mass.
Mortell Co., J. W., Kankakee, Ill.
Motex Metal Process Corp., 4473-4475 W. Jefferson Ave., Detroit, Mich.
Motionair Co., 9242 Beverly Bldg., Beverly Hills, Calif.
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland 13, O.
Mountain States Equipment Co., 1238 Speer Blvd., Denver 4, Colo.
● Mueller Brass Co., Port Huron, Mich.
Mueller Co., 512 W. Cerro Gordo St., Decatur 70, Ill.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee 7, Wis.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City 1, N. Y.
Multi-Cell Sales Corp., 3420 Nicollet Ave., Minneapolis 8, Minn.
Muncie Gear Wks., Inc., 700 N. Wysor Muncie, Ind.
● Mundet Cork Corp., 65 S. 11th St., Brooklyn 11, N. Y.
Mundt & Sons, Charles, 53 Fairmount Ave., Jersey City 4, N. J.
Munn & Steele, Inc., 130 Lister Ave., Newark 5, N. J.
Munton Mfg. Co., 9400 Belmont Ave. Franklin Park, Ill.
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia.
● Murray Mfg. Co., D. J., 1002-24 Third St., Wausau, Wis.
Mutual Chemical Co. of America, 270 Madison Ave., New York 16, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Myers Electric Co., Inc., 209 First Ave., Pittsburgh 22, Pa.
Mystik Adhesive Products Div., Chicago Show Printing Co., 2635 N. Kildare, Chicago 39 Ill.

● Nash Engineering Co., 307 Wilson Ave., South Norwalk, Conn.
Nason Co., 7663 Epworth Blvd., Detroit 4, Mich.
Nat Corp., 2710 McGee St., Kansas City, Mo.
National Acme Co., The, 131st & Chapin St., Cleveland, O.
National Airoil Burner Co., Inc., 1284 E. Sedgley Ave., Philadelphia 34, Pa..
National Aluminate Corp., 6215 W. 66th Pl., Chicago 38, Ill.
National Carbon Co., 30 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6, Ill.
National Engineering & Mfg. Co., 213 W. 19th St., Kansas City, Mo.
National Engineering Products, Inc., Commerce and Savings Bldg., Washington, D. C.
National Gas Burners, Div. of Mid-Continent Metal Products Co., 1960 Clybourn Ave., Chicago 14, Ill.
National Gypsum Co., Delaware Ave. Buffalo, N. Y.
National Heater Co., 401 Essex Bldg., Minneapolis 2, Minn.
National Lead Co., 111 Broadway, New York 6, N. Y.
National Machine Wks., 122 S. Michigan Ave., Chicago 3, Ill.
National Mfg. Corp., 151 Fillmore Ave., Tonawanda, N. Y.
National Metal Fabricators, 2138 S. Sawyer, Chicago 23, Ill.
National Meter Co., 4221 First Ave., Brooklyn 32, N. Y.
National Oil Burner Corp., 544 Vanderbilt Ave., Brooklyn, N. Y.
National Pipe Bending Co., 122 River St., New Haven 13, Conn.
National Pumpless Blowtorch Co., 7500 Stanton Ave., Cleveland, O.
National Radiator Co., The, 221 Central Ave., Johnstown, Pa.
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O.
National Time & Signal Corp., 21800 Wyoming Ave., Detroit 20, Mich.
National Tube Co., United States Steel Corp., Subsidiary, Frick Bldg., Pittsburgh 30, Pa.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh 1, Pa.
Nationalaire Corp., 13313 Averhill St., Detroit 13, Mich.
Naugatuck Mfg. Co., Union City, Conn.
● Naylor Pipe Co., 1251 E. 92nd St., Chicago 19, Ill.
Nebel Mfg. Co., P. O. Box 3942, Shaker Square Sta., Cleveland 20, O.
Nelson Chemical Pumps, Box 2235, Casper, Wyo.
Nelson Co., 2604 Fourth Ave., Detroit, Mich.
Nelson Corp., Herman, 1824 Third Ave., Moline, Ill.
Nelson Mfg. Co. B. F., 401 Main St., N. E., Minneapolis 13, Minn.
Nelson Specialty Welding Equipment Corp., 440 Peralta Ave., San Leandro Calif.
Neptune Meter Co., 50 W. 50th St., New York 20, N. Y.
● Nesbitt, Inc., John J., State Rd. & Rhawn St. Philadelphia 36, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
New Albany Machine Mfg. Co. E. 10th & Water Sts., New Albany, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
● New England Cooling Tower Co., 89 Broad St., Boston 10, Mass.
New Haven Copper Co., Seymour, Conn.
New Jersey Zinc Sales Co., Front & Fletcher Sts., New York 7, N. Y.
New York Air Valve Corp., 611-621 Broadway, New York, N. Y.
New York Blower Co., 3159 Shields Ave., Chicago 16, Ill.
New York Brass Foundry, 405 Broome St., New York, N. Y.
Newark Wire Cloth Co. 351 Verona Ave., Newark 4, N. J.
Newcomb Engineering Co., 526-28 Monroe Ave., Grand Rapids 2, Mich.
Newman Brothers, Inc., 666 W. Fourth St., Cincinnati, O.
Newman Co., Inc., I. C., 6 E. 45th St., New York, N. Y.
Newport Rolling Mill Co., Div. National Detrola Corp., Ninth & Lowell Sts. Newport, Ky.
Niagara Blower Co., 6 E. 45th St., New York 17, N. Y.
Niagara Machine & Tool Wks., 637-697 Northland Ave., Buffalo 11, N. Y.
Nice Ball Bearing Co., 30th and Hunting Park Ave., Philadelphia 40, Pa.
● Nicholson & Co., W. H., 12 Oregon St., Wilkes-Barre, Pa.
Niles Rolling Mill Co., Niles, O.
Noera Mfg. Co., Div. Chase Brass & Copper Co., Waterbury 91, Conn.
Nooter Boiler Works, John, 1400 S. Second St., St. Louis 4, Mo.
Norgren Co., C. A., 222 Santa Fe Dr., Denver 9, Colo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Norman Products Co., Inc., 1150 Chesapeake Ave., Columbus, O.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
North American Fibre Products Co., The, Standard Bldg., Cleveland 13, O.
North American Mfg. Co., 4455 E. 71st St., Cleveland, O.
North American Phillips Co., Inc., 100 E. 42nd St., New York 17, N. Y.
North Penn Co., 72 Fifth Ave., New York 11, N. Y.
Northern Blower Co., 6409 Barberton Ave., Cleveland 2, O.
Northern Equipment Co., 1945 Grove Drive, Erie 6, Pa.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Northern Steel & Stoker Corp., 3100 Prospect Rd., Peoria 4, Ill.
Northern Weatherstrip Co., 367 S. First Ave., E. Duluth, Minn.
Northwest Foundry & Furnace Co., 2345 S. E. Gladstone St., Portland 2, Ore.
Northwest Lead Co., 2700 16th Ave., S. W., Seattle 4, Wash.
Norwin Co., E. Album St., Freeport, Ill.
Norwood Filtration Co., The, N. Maple St., Florence, Mass.
Nu-Way Corp., The, 2416 4th Ave., Rock Island, Ill.
Nye Tool & Machine Co., 4120-30 Fullerton Ave., Chicago 39, Ill.

Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
● Obear, E. L., 10224 S. Figueroa St., Los Angeles, Calif.
Oberdorfer Industries, Inc., 3007 Thompson Rd., Syracuse, N. Y.
O'Brien Steam Specialty Co., 205 Harrison St., Syracuse 2, N. Y.
O'Brien Varnish Co., South Bend 21, Ind.
Ohio Brass Co., 380 N. Main St., Mansfield, O.
Ohio Electric Mfg. Co., 5925 Maurice Ave., Cleveland 4, O.
Ohio Injector Co., 275 Main St., Wadsworth, O.
Ohio Pattern Works & Foundry Co., 2735 Colerain Ave., Cincinnati 25, O.
Ohio Pipe Bending & Machine Co., 3900-3910 Trent Ave., Cleveland 9, O.
Ohio Products Co., 16113 Munn Rd., Cleveland 11, O.
Ohl & Son, George A., 159 Oraton St., Newark, N. J.
Ohmlac Paint & Refining Co., 92 Liberty St., New York 6, N. Y.
Oil Heat Master National Sales, 4269-81 Park Ave., New York 57, N. Y.
Oiljack Mfg. Co., Inc., Montclair, N. J.
Oil Well Supply Co., Oil City, Pa.
Olsen Testing Machine Co., Tinius, 12th and Buttonwood Sts., Philadelphia, Pa.
O'Malley Valve Co., Edward, 231 E. 95th St., Chicago, Ill.
O'Neil Irwin Mfg. Co., 800 Jefferson, Lake City, Minn.
Ormsby-Osterman, Inc., 3631 Cass Ave., St. Louis 13, Mo.
Orr & Sembower, Inc., 6th and Walnut, Reading, Pa.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Oster Mfg. Co., 2057 E. 61st Pl., Cleveland 3, O.
Ostlind Valve, Inc., 601 N. E. 28th Ave., Portland 12, Ore.
OverSpred Stoker Co., 77 Washington St., Suite 1702, Chicago 2, Ill.
● Owens-Corning Fiberglas Corp., 1911 Nicholas Bldg., Toledo 1, O.
Ozalid Products Div., General Aniline & Film Corp., Ansco Rd., Johnson City, N. Y.
Ozone Air Co., 1132 Division Ave., S., Grand Rapids 7, Mich.
Ozone Processes Inc., 1500 Walnut St., Philadelphia 2, Pa.

● Pacific Engineering Equipment Co., P. O. Box 1009, Glendale, Calif.
Pacific Lumber Co., The, 100 Bush St., San Francisco 4, Calif.
Pacific Mfg. Corp., 5308 Blanche Ave., Cleveland, O.
Pacific Pumps, Inc., 5716 Bickett St., Huntington Park, Calif.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Calif.
Pacific Steel Boiler Div., United States Radiator Corp., 1500 United Artists Bldg., Detroit 31, Mich.
Pacific Tube Co., 5710 Smithway St., Los Angeles 22, Calif.
Packless Metal Products Corp., 31 Winthrop Ave., New Rochelle, N. Y.
Page Steel & Wire, Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Paine Co., 2951 W. Carroll Ave., Chicago 12, Ill.
Pains Fireworks Display Co., Inc., 11 Park Pl., New York 7, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood) 12, O.
Palmer Electric Co., 20 Sproat St., Detroit 1, Mich.
Palmer Mfg. Corp., 705 W. Jefferson St., Phoenix, Ariz.
Palnut Co., 73 Cordier St., Irvington, N. J.
Pan-American Engineering Co., 820 Parker St., Berkeley 2, Calif.
Panelyte Div., St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
Pangborn Corp., 400 Pangborn Blvd., Hagerstown, Md.
Paragon Electric Co., Two Rivers, Wis.
Paragon-Revolute Corp., 61 South Ave., Rochester 4, N. Y.
Paramount Products Co., 545 Fifth Ave., New York, N. Y.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland 12, O.
Parker Mfg. Corp., 2200 Colorado Ave., Santa Monica, Calif.

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Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.
Parks-Cramer Co., P. O. Box 444, Fitchburgh, Mass.
Patent Novelty Co., 312 Eighth St., Fulton, Ill.
Patrol Valve Co., The, 2310 E. Superior Ave., Cleveland 14, O.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, Calif.
● Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Payne Furnace Co., 336-338 N. Foothill Rd., Beverly Hills, Calif.
Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y.
Pease Co., C. F., The, 2601 W. Irving Park Rd., Chicago 18, Ill.
Peck & Harvey, 4327 W. Addison St., Chicago 41, Ill.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Pecora Paint Co., Inc., 4th St., and Penna. R. R., Philadelphia 40, Pa.
Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Peerless of America, Inc., 2901 Lawrence Ave., Chicago 25, Ill.
Peerless Electric Co., 3021 W. Market St., Warren, O.
Peerless Mfg. Corp., 1400 W. Ormsby St., Louisville, Ky.
● Peerless Pump Div., Food Machinery Corp., 301 West Ave., 26, Los Angeles 31, Calif.
Peerless Unit Ventilation Co., Inc., 810 Union Ave., Bridgeport, Conn.
Penberthy Injector Co., 1242 Holden Ave., Detroit 2, Mich.
Penflex Sales Co., Div. of Pennsylvania Flexible Metallic Tubing Co., 72nd St. & Powers Lane, Philadelphia 42, Pa.
● Penn Electric Switch Co., P. O., Box 556, Goshen, Ind.
Penn Galvanizing Co., 2199 Tioga St., Philadelphia, Pa.
Penn Industrial Instrument Corp., 3116 N. 17th St., Philadelphia, Pa.
Penn Mfg. Corp. of Washington, Pa., 380 W. Chestnut St., P. O. Box 484, Washington, Pa.
Penn Ventilating Co., 3252 Goodman St., Philadelphia 40, Pa.
Pennsylvania Engineering Wks., 526 E. Jefferson St., New Castle, Pa.
Pennsylvania Forge Co., Milnor & Bleigh Sts., Philadelphia, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia 7, Pa.
% Proportioneers, Inc. %, 156 Codding St., Providence 1, R. I.
Perfect Circle Co., The, Hagerstown, Ind.
Perfection Grate & Stoker Co., 4 Fisk Ave., Springfield 7, Mass.
Perfection Refrigeration Parts Co., Harvey, Ill.
Perfex Corp., 500 W. Oklahoma Ave., Milwaukee 7, Wis.
Perkins Machine Co., 4 Perkins Ave., Warren, Mass.
Perkins & Son., Inc., B. F., Chicopee St., Holyoke, Mass.
Permatex Co., Inc., 1716-1720 Avenue Y, Brooklyn 29, N. Y.
Permutit Co., 330 W. 42nd St., New York 18, N. Y.
Persson Co., T. G., 224 Glenwood Ave., Bloomfield, N. J.
Peters-Dalton, Inc., 17900 Ryan Rd., Detroit 12, Mich.
Peterson Co., B. A., Dowagiac, Mich.
Petroleum Equipment Mfg. Co., 75 Brewster St., New Haven, Conn.
● Petroleum Heat & Power Co., Stamford, Conn.
Petrometer Corp., 1 Star Sq., Long Island City 1, N. Y.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus 8, O.
Phelps Dodge Copper Products Corp., British American Tube Div., 40 Wall St., New York 5, N. Y.
Phelps Mfg. Co., 801 Thomas St., Little Rock, Ark.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Philadelphia Pipe Bending Co., 4135-65 N. Fifth St., Philadelphia 40, Pa.
Philadelphia Thermometer Co., 6th & Cayuga St., Philadelphia 40, Pa.
Philco Corp., Tioga and C Sts., Philadelphia 34, Pa.
Phillips & Co., H. A., 3255 W. Carroll Ave., Chicago 24, Ill.
Phillips Cooling Tower Co., Inc., 114 Liberty St., New York 6, N. Y.
Phoenix Brass Fittings Corp., Coit St. & Chancellor Ave., Irvington 11, N. J.
Phoenix Mfg. Co., Joliet, Ill.
Phoenix Ventilator Co., Inc., 1665 63rd St., Brooklyn, N. Y.
Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.
Photovolt Corp., 95 Madison Ave., New York 16, N. Y.
Pick Mfg. Co., West Bend, Wis.
Pier Equipment Mfg. Co., 1440 Milton St., Benton Harbor, Mich.
Pierce Co., Wm. R., The, 133 S. Division, Buffalo 3, N. Y.
Piezo Mfg. Corp., 110 E. 42nd St., New York 17, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill.
Pioneer Roofing & Sheet Metal Co., 226 N. Main St., Muskogee, Okla.
Pipe Fabrication Institute, 1108 Clark Bldg., Pittsburgh, Pa.
Piqua Machine & Mfg. Co., Piqua, O.
Pittsburgh Brass Mfg. Co., 3155 Penn Ave., Pittsburgh, Pa.
Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh 22, Pa.
Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.
● Pittsburgh Lectrodryer Corp., 327 32nd St., Pittsburgh 30, Pa.
Pittsburgh Pipe Coil & Bending Co., 61 Bridge St., Etna 23, Pa.
Pittsburgh Piping & Equipment Co., 43rd St. & A. V. R. R., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., 2000 Grant Bldg., Pittsburgh 19, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Pittsburgh Tube Co., Hagan Bldg., 323 Fourth Ave., Pittsburgh 22, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Pittsburgh Water Heater Corp., Box 4452, Pittsburgh 5, Pa.
Plant Rubber & Asbestos Works, 537 Brannan St., San Francisco 7, Calif.
Plastergon Wall Board Co., Philadelphia Ave., Buffalo 7, N. Y.
Plastic Products Co., 6475 Georgia Ave., Detroit 11, Mich.
Pleasantaire Corp., Tower Bldg., Washington 5, D. C.
Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago 14, Ill.
Plumb Mfg. Co., 1925 Dwyer Ave., Utica 3, N. Y.
Plummer Spray Equipment Co., 700 Filmore St., Napoleon, O.
Plymouth Industries, Inc., 1932 Harrison Ave., Plymouth, Ind.
Pocahontas Fuel Co., Inc., Stoker Div., 340 E. 131st St., Cleveland 8, O.
Poe Co., C. W., The, Mayfield at Lee, Cleveland 18, O.
Polo Pump Co., Polo, Ill.
Poole Foundry & Machine Co., 1700 Union Ave., Woodberry, Baltimore 11, Md.
● Porter & Co., Inc., H. W., 825 Frelinghuysen Ave., Newark 5, N. J.
Potter & Brumfield Sales Co., 549 W. Washington Blvd., Chicago 6, Ill.
Potts Sons & Co., W. F., 1224 Cherry St., Philadelphia, Pa.
Powder Weld Co., 419 Kent Ave., Brooklyn, N. Y.
Powell Co., Wm., The, 2525 Spring Grove Ave., Cincinnati 22, O.
Power Engineering Co., 361 E. Ohio St., Chicago 11, Ill.
Power Piping Div., Blaw Knox Co., 829 Beaver Ave., Pittsburgh 12, Pa.
Powermatic Ventilator Co., 4019 Prospect Ave., Cleveland 3, O.
Powers Regulator Co., 2759 Greenview Ave., Chicago 14, Ill.
Prat-Daniel Corp., Port Chester, N. Y.
Precision Scientific Co., 3737 Cortland St., Chicago 47, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia 30, Pa.
Precision Welder & Machine Co., 135 E. McMicken Ave., Cincinnati, O.
Preferred Utilities Mfg. Corp., 1860 Broadway, New York 23, N. Y.
Premier Furnace Co., Box 150, Dowagiac, Mich.
Presstite Engineering Co., 3900 Chouteau St., St. Louis 10, Mo.
● Pritchard & Co., J. F., Equipment Div., 2200 Fidelity Bldg., Kansas City 6, Mo.
Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.
Products Research Co., 634 S. Western Ave., Los Angeles 5, Calif.
Propellair, Inc., 1345 Lagonda Ave., Springfield, O.
Protected Steel Products Co., McAdams Ave., Washington, Pa.
Protective Coatings, Inc., P. O. Box 3985, Stratmoor Station, Detroit 27, Mich.
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis 20, Mo.
Pure Carbonic, Inc., 60 E. 42nd St., New York 17, N. Y.
● Pyle-National Co., The, 1334 N. Kostner Ave., Chicago 51, Ill.
Pyott Foundry & Machine Co. 328 N. Sangamon St., Chicago, Ill.
Pyrolite Products Co., 1221-1231 W. 74th St., Cleveland 2, O.
Pyrometer Instrument Co., 103 Lafayette St., New York 13, N. Y.

Q-P Mfg. Co., Needham Heights, Mass.
Quaker City Iron Wks., Allegheny & Tulip St., Philadelphia 34, Pa.
Quaker Rubber Corp., Comly & Milnor Sts., Philadelphia 24, Pa.
Quickwork Div., Whiting Corp., Harvey, Ill.
Quigley Co., Inc., 527 Fifth Ave., New York 17, N. Y.
Quimby Pump Div., H. K. Porter Co., Inc., 49th & Harrison Sts., Lawrenceville, Pa.

R-S Products Corp., Germantown Ave. at Wayne Junction, Philadelphia 44, Pa.
Radiator Specialty Co., 1700-1900 Dowd Rd., Charlotte 1, N. C.
Rafter Machine Co., Inc., 259 Stephens St., Belleville 9, N. J.
Raisler Corp., Grimes Sprinkler Div., 129 Amsterdam Ave., New York 23, N. Y.
Ramsey Chain Co., Inc., 1029 Broadway, Albany 1, N. Y.
Ramtite Co., The, 2563 W. 18th St., Chicago 8, Ill.
Ranco, Inc., 601 W. 5th Ave., Columbus 1, O.
● Randall Graphite Products Corp., 609 W. Lake St., Chicago 6, Ill.
Ransome Machinery Co., Subsidiary of Worthington Pump & Machinery Corp., Dunellen, N. J.
Ravena Iron Co., Ravena, N. Y.
Rawlplug Co., Inc., The, 271 Church St., New York 13, N. Y.
Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco 12, Calif.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., 61 Willett St., Passaic, N. J.
Rayfield Co., C. L., 2010-18 S. Halsted St., Chicago 8, Ill.
Raymond Pulverizer Div., Combustion Engineering Co., 1324 N. Branch St., Chicago, Ill.
Raytheon Mfg. Co., Industrial Electronics Div., Waltham 54, Mass.
● Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Reading Tube Corp., Empire State Bldg., New York 1, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Red Spot Electric Co., 7405 S. Tacoma Way, Tacoma 9, Wash.
Redmond Co., Inc., Owosso, Mich.
Reed Unit-Fans, Inc., 1001 St. Charles Ave., New Orleans 8, La.
Reeves Pulley Co., H. P., Columbus, Ind.
Reeves Steel & Mfg. Co., Dover, O.
Refinite Corp., Refinite Bldg., Omaha 8, Neb.
Refractory & Insulation Corp., 120 Wall St., New York 5, N. Y.
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill.
Refrigeration Economics Co., Inc., 1231 Tuscarawas E., Canton 2, O.
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester 7, N. Y.
Register & Grille Mfg. Co., Inc., 70 Bery St., Brooklyn, N. Y.
Reichert Float & Mfg. Co., 2238 Smead Ave., Toledo 6, O.
Reif-Rexoil, Inc., 37-41 Carroll St., Buffalo 3, N. Y.
Reilly Tar & Chemical Corp., 1615 Merchants Bank Bldg., Indianapolis 4, Ind.
Reiner & Campbell Co., Inc., 667 Norwood Terrace, Elizabeth 2, N. J.
Reinhard Brothers Co., 11-17 S. 9th St., Minneapolis 2, Minn.
Reliable Perforating Co., 2047 N. Wood St., Chicago, Ill.
Reliable Sheet Metal Engineering Co., 4334-50 S. Knox, Chicago, Ill.
Reliance Automatic Lighting Co., 1929 Mead St., Racine, Wis.
Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, O.
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill.
Remco Products Corp., State and Hay Sts., York, Pa.
Remington Corp., Cortland, N. Y.
● Rempe Co., 362 N. Sacramento Blvd., Chicago 12, Ill.
Rensselaer Valve Co., Ontario St., Cohoes, N. Y.
Reps Tool Co., Inc., 99 Wall St., New York 5, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Republic Steel Corp., Republic Bldg., Cleveland 1, O.
Republic Steel Corp., Bolt & Nut Div., 1970 Carter Ave., Cleveland 13, O.
Research Corp., Chrysler Bldg., New York 17, N. Y.
● Research Products Corp., 1015 E. Washington Ave., Madison 3, Wis.
Resisto Pipe & Valve Co., 262 Bridge St., East Cambridge, Mass.
Resistoflex Corp., Belleville 9, N. J.
● Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.

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Rex Clay Products Co., 14414 Dexter Blvd., Detroit, Mich.
Rex Welder & Engineering Co., 7 E. 19th St., Kansas City 8, Mo.
Reynolds Electric Co., 2603 W. Congress St., Chicago 12, Ill.
Reynolds Mfg. Co., The, 412 Prospect St., N. E., Grand Rapids, Mich.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Reynolds Metals Co., Reynolds Metals Bldg., Richmond 19, Va.
Reznor Mfg. Co., Mercer, Pa.
Rheem Mfg. Co., 570 Lexington Ave., New York 22, N. Y.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia 6, Pa.
Rhode Island Fittings Co., Hillsgrove, R. I.
Rhode Island Humidifier & Ventilator Co., 99 Chauncy St., Boston 11, Mass.
Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford, Conn.
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va.
Richmond Fireproof Door Co., Northwest F St., Richmond, Ind.
Richmond Radiator Co., Gas Products Div., 19 E. 47th St., New York 17, N. Y.
Richmont, Inc., 2810 E. 11th St., Los Angeles 23, Calif.
• Ric-wil Co., 1562 Union Commerce Bldg., Cleveland 14, O.
• Ridge Tool Co., Clark St., Elyria, O.
Rid-Sludge Div., Aulwood Mfg. Co., 77 Raymond Ave., St. Paul, Minn.
Riggin Metal Products, Inc., Box 267, Kankakee, Ill.
Rigid-Tex Corp., 658 Ohio St., Buffalo 3, N. Y.
Riley Stoker Corp., 9 Neponset St., Worcester, Mass.
• Rittling Corp., The, Buffalo, N. Y.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O.
Roberts-Gordon Appliance Corp., 137 Arthur St., Buffalo 7, N. Y.
Roberts Tube Works, 2500 Military Ave., Detroit 9, Mich.
Robertson Co., H. H., 2400 Farmers Bank Bldg., Pittsburgh 22, Pa.
Robinson Aviation, Inc., Vibrashock Div., Teterboro Air Terminal, Teterboro, N. J.
Robinson Insulation Co., Great Falls, Mont.
Rochester Lead Works, Inc., 380 Exchange St., Rochester 8, N. Y.
Rochester Mfg. Co., Inc., 100 Rockwood St., Rochester 10, N. Y.
Rock Fleece Co., 115 Durango St., El Paso, Tex.
Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.
Rockford Screw Products Co., 2501 Ninth St., Rockford, Ill.
Rockwood Mfg. Co., 1801-2001 English Ave., Indianapolis 6, Ind.
Rockwood Sprinkler Co., 38 Harlow St., Worcester 5, Mass.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Branch, Pittsburgh 15, Pa.
Rogers Companies, Inc., R. B. (Rogers-Research Div.), 1120 Leggett Ave., New York 59, N. Y.
Roller Bearing Co. of America, Whitehead Rd., Trenton 3, N. J.
Rolyan Metal Products, 2330 W. 58th St., Chicago 36, Ill.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Rook Co, Leonard, 1360 Elmwood Ave., Providence, R. I.
Roots-Connersville Blower Corp., 16th St. & Columbia Ave., Connersville, Ind.
Roper Corp., Geo. D., Blackhawk Park Ave., Rockford, Ill.
Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore.
Rosedale Foundry & Machine Co., Columbus & Preble Aves., N. S., Pittsburgh, Pa.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo 13, N. Y.
Ross Sprinkler Co., 34 Roberts St., Pasadena 3, Calif.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Calif.
Rotary Seal Co., 2020 N. Larrabee St., Chicago 14, Ill.
Rotor Corp., Miamisburg, O.
Roxalin Flexible Finishes, Inc., 800 Magnolia Ave., Elizabeth F., N. J.
Roy Co., Milton, 1371 E. Mermaid Ave., Philadelphia 18, Pa.
Royal Heaters, Inc., 1024 Westminster Ave., Alhambra, Calif.
Royal Ventilator Co., 415 Locust St., Philadelphia 6, Pa.
Royersford Foundry & Machine Co., Inc., 102-132 Main St., Royersford, Pa.
Roylyn, Inc., 718 W. Wilson Ave., Glendale 3, Calif.
Ruberoid Co., 500 Fifth Ave., New York, N. Y.
Ruby Chemical Co., 74 McDowell St., Columbus 8, O.
Ruehfel Co., Inc., George, 101 Menahan St., Brooklyn, N. Y.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., P. O. Box 550, Salem, Mass.
Ruppright, Siegfried, 299 S. Atlantic Blvd., Los Angeles 22, Calif.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
• Russell Co., F. C., The, 6400 Herman Ave., Cleveland 2, O.
Russell Electric Co., 348 W. Huron St., Chicago 10, Ill.
Russell Mfg. Co., John M., Box 246, Naugatuck, Conn.
Ruthman Machinery Co., 1810 Reading Rd., Cincinnati, O.
• Rutland Fire Clay Co., Curtis Ave., Rutland, Va.
Ruud Mfg. Co., 2934 Smallman St., Pittsburgh 1, Pa.
Ryniker Steel Products Co., 122-124 N. 25th St., Billings, Mont.

SKF Industries, Inc., Front St. & Erie Ave., Philadelphia 32, Pa.
St. Louis Tool Co., 6100 Prescott St., St. Louis 15, Mo.
St. Paul Corrugating Co., S. Wabasha and Water Sts., St. Paul 1, Minn.
Sac Tool Mfg. Co., 1913 Washington Ave., St. Louis 3, Mo.
Sales & Co., Murray W., 801 W. Baltimore Ave., Detroit 2, Mich.
Salina Metal Products Co., 9th and Bishop, Salina, Kan.
Sall Mountain Co., 176 W. Adams St., Chicago 3, Ill.
Salsbury Motors, Inc., 1201 E. Lexington St., Pomona, Calif.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sandberg Sheet Metal Works, 500 N. E. Union Ave., Portland, Ore.
Sandee Mfg. Co., 3945 N. Western Ave., Chicago 18, Ill.
Sangamo Electric Co., 1301 N. 11th St., Springfield, Ill.
• Sarco Co., Inc., 475 Fifth Ave., New York 17, N. Y.
Sarcotherm Controls, Inc., 280 Madison Ave., New York 16, N. Y.
Sauereisen Cements Co., Sharpsburg Station, Pittsburgh 15, Pa.
Saunders Machine & Tool Corp., 25 Atherton St., Yonkers, N. Y.
Saverite Engineering Co., 1030 Willow Ave., Hoboken, N. J.
Sawyer Electrical Mfg. Co., 5701 Smithway, Los Angeles, Calif.
Sawyer Heating Co., 5736 12th St., Detroit, Mich.
Scaife Co., 26 Ann St., Oakmont, Pa.
Scanlan-Morris Co., Madison 4, Wis.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia 33, Pa.
Schaible Co., The, Cincinnati 4, O.
Schatz Mfg. Co., The, Fairview, Poughkeepsie, N. Y.
• Schaub Engineering Co., Fred. H., 2110 S. Marshall Blvd., Chicago, Ill.
Schecter Brothers Co., Hancock and Huntingdon Sts., Philadelphia 33, Pa.
Schieren Co., Chas. A., 30-38 Ferry St., New York 7, N. Y.
Schild Mfg. Co., 739 Broadway, Milwaukee, Wis.
Schmeig Industries, 312-320 Piquette Ave., Detroit 2, Mich.
Schneible Co., Claude B., 2827 25th St., Detroit 16, Mich.
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus 16, O.
Schramm, Inc., West Chester, Pa.
Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Schwitzer-Cummins Co., 1125 Massachusetts Ave., Indianapolis 7, Ind.
Sciaky Bros., Inc., 4915 W. 67th St., Chicago 38, Ill.
• Scientiae Tool Co., 101 Pine, Dayton, O.
Scientific Instrument Co., 531-535 W. Larned, Detroit 26, Mich.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit 8, Mich.
Scully Signal Co., 88 First St., Cambridge 41, Mass.
Sealed Power Corp., 500 Sanford St., Muskegon 61, Mich.
Sealkote Corp., 400 N. Sangamon St., Chicago, Ill.
Sealol Corp., 45 Willard Ave., Providence 5, R. I.
Seamlex Co., Inc., 41-23 24th St., Long Island City 1, N. Y.
Selas Corp. of America, Erie Ave. and D St., Philadelphia 34, Pa.
Sellers Engineering Co., 4860 N. Clark St., Chicago 40, Ill.
Semco Mfg. Co., 118-122 Third Ave., N., Nashville, Tenn.
Semet-Solvay Engineering Corp., 40 Rector St., New York 6, N. Y.
Semler Co., Jeannette, Pa.
Semon Bache & Co., Greenwich & Morton Sts., New York 14, N. Y.
Servel, Inc., Electric Refrigeration Div., 119 Morton Ave., Evansville 20, Ind.
Service To Industry, Box 133, West Hartford, Conn.
Service Machine Co., 158 Miller St., Elizabeth 4, N. J.
Shafer Bearing Corp., 1412 W. Washington, Chicago 7, Ill.
Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.
Shallcross Co., 48th and Grays Ferry Rd., Philadelphia 43, Pa.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee 2, Wis.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago 6, Ill.
Sharon Steel Corp., Sharon, Pa.
Shaw Burner Co., 1200-12 S. Summit St., Arkansas City, Kan.
Shaw Co., Benjamin F., Second & Lombard Sts., Wilmington 99, Del.
Shaw-Kendall Engineering Co., 120-130 S. Superior St., Toledo 4, O.
Shaw-Perkins Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa.
Sheet Metal Mfg. Co., Inc., 953 Myrtle Ave., Brooklyn 6, N. Y.
Sheetlock Co., 4521 N. Clark St., Chicago, Ill.
Sheffler-Gross Co., Drexel Bldg., Philadelphia, 6, Pa.
Sherwin-Williams Co., The, 101 Prospect Ave., N. W., Cleveland, O.
Shreveport Engineering Co., Inc., 1553-55 Texas Ave., Shreveport, La.
Sight Feed Generator Co., 14-18 N. 10th St., Richmond, Ind.
Signal Electric Mfg. Co., Menominee, Mich.
Signal Indicator Co., 140 Cedar St., New York, N. Y.
Silvercote Products, Inc., 161 E. Erie St., Chicago 11, Ill.
Simplex Heating Specialty Co., Inc., 1105 Church St., Lynchburg, Va.
Simplex Mfg. Co., 198 N. Main St., Fond du Lac, Wis.
Simplex Oil Heating Corp., 11 Park Pl., New York 7, N. Y.
Sims Co., 18th & Whitley Sts., Erie, Pa.
Sinker-Davis Co., 230 S. Missouri St., Indianapolis 4, Ind.
Sioux Steel Co., P. O. Box 898, Sioux Falls, S. D.
Sipe & Co., James B., Box 8010, S. Hills Branch, Pittsburgh, Pa.
Skidmore Corp., St. Joseph, Mich.
Skilbeck Mfg. Co., 7432 27th Ave., Kenosha, Wis.
Skilsaw, Inc., 5033 Elston Ave., Chicago 30, Ill.
Skinner Co., M. B., South Bend, Ind.
Skinner Engine Co., 337 W. 12th St., Erie, Pa.
• Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., 1948 N. 9th St., St. Louis 6, Mo.
Skinner Irrigation Co., 1211 E. Canal St., Troy, O.
Skuttle Mfg. Co., 517 E. Larned St., Detroit 26, Mich.
Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland 2, O.
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill.
• Smith Co., Inc., H. B., The, 57 Main, Westfield, Mass.
Smith Co., J. B., 3327 B St., Philadelphia 34, Pa.
Smith Corp., A. O., 3533 N. 27th St., Milwaukee 1, Wis.
Smith Heater Co., Peter, 10501 Haggerty, Dearborn, Mich.
Smith, Inc., James Campbell, 1679 Collamer Rd., Cleveland, O.
Smith, Inc., Winfield, H., 144 Eaton St., Springville, Erie County, N. Y.
Smith & Kanzler Corp., E. Linden Ave., Linden, N. J.
Smith Mfg. Co., Inc., F. A., P. O. Box 509, Rochester 2, N. Y.
Smith-Raymond Co., 1231-33 Tenth Ave., Columbus, Ga.
Smith Twin Tubular Boiler Co., Inc., Cottman St., at State Rd., Philadelphia 35, Pa.
Smith Welding Equipment Corp., 2633 S. E. Fourth St., Minneapolis 14, Minn.
Smolensky Valve Co., Inc., 940 Broadway, Bedford, O.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City 4, N. J.
Snap-On Tools Corp., Kenosha, Wis.
Snyder Sales Corp., 5225 Wilshire Blvd., Los Angeles 36, Calif.
Sola Electric Co., 2525 Clybourn Ave., Chicago 14, Ill.
Solvay Sales Corp., 40, Rector St., New York 6, N. Y.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit 8, Mich.
Somerville Iron Wks., Somerville, N. J.
Sonneborn Sons., Inc., L., 88 Lexington Ave., New York 16, N. Y.
Sonner Burner Co., 412-420 E. 6th Ave., Winfield, Kans.
Soreng Mfg. Co., 1903 N. Clybourn Ave., Chicago, Ill.
• South Bend Air Products, Inc., 304 E. Colfax Ave., South Bend 22, Ind.
South Chester Tube Co., Front & Thurlow Sts., P. O. Box 60, Chester, Pa.
Southbridge Roofing Co., Inc., Hartwell and Chapin St., Southbridge, Mass.

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Souther Iron Co., E. E., 1952 Kienlen Ave., St. Louis 20, Mo.
Southern States Iron Roofing Co., Stiles Ave., Savannah, Ga.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
● Spang-Chalfant, Div. of National Supply Co., Grant Bldg., Pittsburgh 30, Pa.
Spartan Tool Co., 6007 N. Lincoln Ave., Chicago, Ill.
Special Chemicals Corp., 30 Irving Pl., New York 3, N. Y.
Specialty Converters, Inc., East Braintree, Mass.
Speedway Mfg. Co., 1834 S. 52nd Ave., Chicago (Cicero), Ill.
Spence Engineering Co., Inc., 32 Grant St., Walden 6, N. Y.
Spencer Heater Div., The Aviation Corp., 164 Park St., Williamsport, Pa.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.
Spencer Turbine Co., 486 New Park Ave., Hartford 6, Conn.
Sponge Rubber Products Co., Shelton, Conn.
● Sporlan Valve Co., 3723 Commonwealth St., St. Louis 17, Mo.
Spray Engineering Co., 114 Central St., Somerville 45, Mass.
● Spraying Systems Co., 4031 W. Lake St., Chicago 24, Ill.
Sprayo-Flake Co., 2715 Irving Park Blvd., Chicago 18, Ill.
Springfield Boiler Co., 1939 E. Capitol Ave., Springfield, Ill.
Sprout-Waldron & Co., Muncy, Pa.
Square D Co., 6060 Rivard St., Detroit 11, Mich.
Square D Co., Industrial Controller Div., 4041 N. Richards St., Milwaukee 12, Wis.
Squires Co., C. E., The, E. 40th St., & Kelley Ave., Cleveland 3, O.
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago 7, Ill.
Standard Electric, Div. of Standard Dayton Corp., P. O. Box 1001, Dayton 1, O.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Standard Fuel Engineering Co., 667 Post Ave., S. Detroit 17, Mich.
Standard Furnace & Supply Co., 413-17 S. Tenth St., Omaha 8, Neb.
Standard Galvanizing Co., 2619 W. Van Buren St., Chicago, Ill.
Standard Heater & Oil Equipment Co., 245 Cornelison Ave., Jersey City 2, N. J.
Standard Lime & Stone Co., 2004 First National Bank Bldg., Baltimore, Md.
Standard Motor Corp., Elyria, O.
Standard Pressed Steel Co., Jenkintown, Pa.
Standard Reseater Corp., 423 W. 126th St., New York 27, N. Y.
Standard Rolling Mills, Inc., 143 Jewel St., Brooklyn 22, N. Y.
● Standard Stamping & Perforating Co., 3151 W. 49th Pl., Chicago 32, Ill.
Standard Thermometer, Inc., 952 Dorchester Ave., Boston 25, Mass.
Standard Transmission Equipment Co., 3407 Verdugo Rd., Los Angeles 41, Calif.
Standard Tube Co., 14600 Woodward Ave., Highland Park 3, Mich.
Standard Ventilator Co., Lewisburg, Pa.
Stanley Electric Tools, Div. of The Stanley Works, Elm St., New Britain, Conn.
Stanley Works, The, Elm St., New Britain, Conn.
Staples & Pfeiffer, 528 Bryant St., San Francisco 7, Calif.
Star Electric Motor Co., 200 Bloomfield Ave., Bloomfield, N. J.
Star Expansion Bolt Co., 147 Cedar St., New York 6, N. Y.
Star Mfg. Co., Inc., 530 Kinsley Ave., Providence, R. I.
Star Products Co., 130 Walnut Ave., New York 54, N. Y.
Starr Piano Co., Richmond, Ind.
Steamaire Co., Cincinnati 2, O.
Steel City Electric Co., 1201 Columbus Ave., Pittsburgh, Pa.
Steel Improvement & Forge Co., 974 E. 64th St., Cleveland 14, O.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, Ohio.
Steel and Tubes Div., Republic Steel Corp., 224 E. 131st St., Cleveland 8, O.
Steinhorst & Sons, Inc., Emil, 612 South St., Utica 3, N. Y.
● Stephens-Adamson Mfg. Co., 47 Ridgeway Ave., Aurora, Ill.
Sterling Electric Motors, Inc., 5401 Anaheim Telegraph Rd., Los Angeles 22, Calif.
Sterling Engineering & Mfg. Corp., 114 Business St., Hyde Park 36, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee 12, Wis.
Stevens Mfg. Co., Inc., Mansfield, O.
Stewart Ice Machine Co., 1046 E. 22nd St., Los Angeles, Calif.
● Stewart Mfg. Co., Inc., 610 Bloomfield Ave., Bloomfield, N. J.
Stewart-Rogers, Inc., 3915 Powelton Ave., Philadelphia 4, Pa.
Stewart-Warner Corp., 1826-1852 Diversey Parkway, Chicago 14, Ill.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis 1, Ind.
Stockham Pipe Fittings Co., 4100 Tenth Ave., N. Birmingham 2, Ala.
Stokes Machine Co., F. J., 5910 Tabor Rd., Philadelphia 20, Pa.
Stokes Molded Products, Taylor & Webster, Trenton 4, N. J.
Stokol-Stoker, 21st and Northwestern, Indianapolis, Ind.
Stout & Sons, David, 7016 Manchester Blvd., St. Louis 17, Mo.
Stow Mfg. Co., 445 State St., Binghamton, N. Y.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, 218 S. Geddes St., Syracuse 4, N. Y.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Strong, Carlisle & Hammond Company, 1392 W. Third St., Cleveland 13, O.
Struthers Dunn, Inc., 1321 Arch St., Philadelphia, Pa.
Struthers Wells Corp., Titusville, Pa.
Stuart Co., W. W., 417 Ninth St., Des Moines 9, Iowa.
Sturtevant Co., B. F., Div. of Westinghouse Electric, Hyde Park, Boston 36, Mass.
Sturtevant Co., P. A., Addison, Ill.
Sudbury Laboratory, South Sudbury, Mass.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Sundstrand Machine Tool Co., Pump Div., 2531 11th St., Rockford, Ill.
Sun-Fire Stoker Corp., New Albany, Ind.
Super Mold Corp., 402 N. Sacramento St., Lodi, Calif.
Super Radiator Corp., 652 Stinson Blvd., Minneapolis 13, Minn.
Superior Railway Products Corp., 7501 Thomas Blvd., Pittsburgh, Pa.
Superior Sheet Steel Co., The, Division of Continental Steel Corp., Canton-Louisville Rd., Canton, O.
Superior Steel Corp., Grant Bldg., Pittsburgh 19, Pa.
Superior Valve and Fittings Co., 1509 W. Liberty Ave., Pittsburgh 26, Pa.
Supreme Air Filter Co., 126 W. 21st St., New York, N. Y.
Supreme Electric Products Corp., 194 Vassar St., Rochester 7, N. Y.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
● Sutton Corp., O. A., Beacon Bldg., Wichita 2, Kan.
Swaby Mfg. Co., 2330 W. Cermak Rd., Chicago 8, Ill.
Swaine Mfg. Co., Fred J., 1300 N. Seventh St., St. Louis 6, Mo.
Swan Engineering Co., Inc., 28-58 Nelson St., Bloomfield, N. J.
Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.
Swendeman, Inc., 171 Camden St., Boston, Mass.
Swift Lubricator Co., 19 James Bldg., Elmira, N. Y.
Swift Mfg. Co., Inc., 247 McDougall Ave., Detroit 7, Mich.
Syncromatic Corp., Watertown, Wis.
Synchro-Start Products, 221 E. Cullerton St., Chicago 16, Ill.
Syntron Co., Homer City, Pa.

Taber Pump Co., 272 Elm St., Buffalo 3, N. Y.
Taco Heaters, Inc., 342 Madison Ave., New York 17, N. Y.
Tagliabue Div., C. J., Portable Products Corp., Park & Nostrand Ave., Brooklyn 5, N. Y.
Tal Prestal Bender, Inc., 417 N. Water St., Milwaukee 2, Wis.
● Tallmadge & Co., Webster, 364 Glenwood Ave., East Orange, N. J.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.
● Taylor Forge & Pipe Wks., P. O. Box 485, Chicago 90, Ill.
Taylor-Hall Welding Corp., 212 Dana Ave., N. E., Warren, O.
● Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.
Taylor Sons Co., Charles, 715 Burns St., Cincinnati 14, O.
Taylor-Winfield Corp., 1052 Mahoning Ave., N. W., Warren, O.
Technical Ply-Woods, 228 N. LaSalle St., Chicago 1, Ill.
Techtmann Industries, Inc., 714 W. Wisconsin Ave., Milwaukee 1, Wis.
Tecumseh Products Co., Tecumseh, Mich.
Telsit Insulation Co., 1933 West Farms Rd., Bronx 60, N. Y.
Templeton Bros., 117 Business St., Hyde Park 36, Mass.
Templeton Mfg. Co., 114 Business St., Hyde Park 36, Mass.
Temprite Products Corp., 47 Piquette Ave., Detroit 2, Mich.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Brown-Marx Bldg., Birmingham 2, Ala.
Tennessee Products Corp., American National Bank Bldg., Nashville, Tenn.
Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J.
Terra-Temp Co., Inc., Circle Bldg., Indianapolis 4, Ind.
Terre Haute Boiler Works Co., 1140 Crawford, Terre Haute, Ind.
Terry Steam Turbine Co., The, P. O. Box 1200, Hartford 1, Conn.
Textite Corp., 2110 Roscoe St., Chicago 18, Ill.
Thatcher Furnace Co., Centre St., Garwood, N. J.
Thermac Co., 800 E. 108th St., Los Angeles, Calif.
Thermal Co., Inc., 1434 N. Fourth St., Milwaukee, Wis.
Thermal Engineering Co., 2967 S. LaSalle St., Chicago 16, Ill.
Thermal Industries, Box No. 725, Indio, Calif.
Thermix Engineering Co., First National Bank Bldg., Greenwich, Conn.
Thermoid Rubber, Div. of Thermoid Co., Whitehead Rd., Trenton 6, N. J.
Thomas Co., Arthur H., W. Washington Square, Philadelphia, Pa.
Thompson & Co., Box 6757, Pittsburgh, Pa.
Thompson & Son Co., The Henry G., 277 Chapel St., New Haven, Conn.
Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.
Thomson Industries, Inc., 2905 Review Ave., Long Island City 1, N. Y.
● Thrush & Co., H. A., Peru, Ind.
Thwing-Albert Instrument Co., Penn and Pulaski Sts., Philadelphia, Pa.
Tierney Rotor Ventilator Co., 239 Fourth Ave., S., Minneapolis, Minn.
Tiffin Eaves Trough Clamp Co., 25 Miami, Tiffin, O.
Timken Roller Bearing Co., 1835 Dueber Ave., S. W., Canton 6, O.
Timken Roller Bearing Co., Steel and Tube Div., Canton 6, O.
● Tinnerman Products, Inc., 2018 Fulton Rd., Cleveland 13, O.
Tippett & Wood, Morris and Warren Sts., Phillipsburg, N. J.
Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.
● Titusville Iron Wks. Co., S. Franklin St., Titusville, Pa.
Todd Shipyards Corp., Combustion Equipment Div., 601 W. 26th St., New York 1, N. Y.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo 4, O.
Torchweld Equipment Div., National Cylinder Gas Co., 4700 W. 19th St., Chicago 50, Ill.
Torit Mfg. Co., 292 Walnut St., St. Paul 2, Minn.
Tork Clock Co., Inc., 1 Grove St., Mt. Vernon, N. Y.
Torrington Mfg. Co., 70 Franklin St., Torrington, Conn.
Trade-Wind Motorfans, Inc., 5725 S. Main St., Los Angeles 37, Calif.
Trageser Copper Wks., Inc., 5000 Grand Ave., Maspeth, Long Island, N. Y.
● Trane Co., The, La Crosse, Wis.
Trent Co., Harold E., Leverington Ave. and Wilde St., Philadelphia 27, Pa.
Trent Tube Mfg. Co., East Troy, Wis.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit 16, Mich.
Triangle Mfg. Co., 396 Division St., Oshkosh, Wis.
Trimont Mfg. Co., 55-71 Amory St., Roxbury, Boston 19, Mass.
Trimount Instrument Co., 37 W. Van Buren St., Chicago 5, Ill.
Trimount Rotary Power Co., 189 Cedar St., P. O. Box 65, East Dedham, Mass.
Trindl Products, Ltd., 17 E. 23rd St., Chicago 16, Ill.
Triplex Heating Specialty Co., Inc., 252 N. Grant, Peru, Ind.
Trombetta Solenoid Co., 421 E. Clybourn, Milwaukee, Wis.
Tropical Paint & Oil Co., 1244-82 W. 70th St., Cleveland 2, O.
Troy Engine & Machine Co., 5 Railroad Ave., Troy, Pa.
Truflo Fan Co., 523 Main St., Harmony, Pa.
Tru-Line Corp., 1725 Clover Field Blvd., Santa Monica, Calif.
Trumbull Electric Mfg. Co., The, Woodford Ave., Plainville, Conn.
Truscon Laboratories, Caniff and Grand Trunk R. R., Detroit 11, Mich.
Truscon Steel Co., 1315 Albert St., Youngstown 1, O.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
● Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

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Tubing Appliance Co., 3881 Victoria Ave., Los Angeles 43, Calif.
Tubing Seal-Cap, Inc., 2810 E. 11th St., Los Angeles 23, Calif.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.
Turner Brass Wks., The, 821-47 Park Ave., Sycamore, Ill.
Tuthill Pump Co., 939 E. 95th St., Chicago 19, Ill.
• Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Tweco Products Co., Wichita, Kan.
XXth Century Heating & Ventilating Co., 96 Ira Ave,. Akron 1, O.

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54, Calif.
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati 14, O.
U. S. Expansion Bolt Co., P. O. Box 827, State St. & P. R. R., York, Pa.
U. S. Gutta Percha Paint Co., 43 Dudley St., Providence 1, R. I.
U. S. Machine Corp., Lebanon, Ind.
U. S. Pipe & Mfg. Co., 249 First St., San Francisco 5, Calif.
USHCO Mfg. Co., Inc., 135 Tonawanda St., Buffalo 7, N. Y.
Uehling Instrument Co., 473 Getty Ave., Paterson 3, N. J.
Una Welding, Inc., 1615 Collamer Ave., E. Cleveland 10, O.
Underground Steam Construction Co., 73 Pitts St., Boston 14, Mass.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Union Asbestos & Rubber Co., 54th Ave. and 18th St., Cicero 50, Ill.
Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Union Iron Wks., 1500 Cascade St., Erie, Pa.
Union Metal Wks., 128 Carter St., Chelsea 50, Mass.
Union Steam Pump Co., Capitol Ave., S. W., Battle Creek, Mich.
Union Water Meter Co., 333 Hermon St., Worcester, Mass.
United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y.
United Cinephone Corp., Torrington, Conn.
United Cork Companies, Central Ave., Kearny, N. J.
United Electric Controls Co., 69-71 A St., Boston 27, Mass.
United Metal Hose Co., Inc., 36-01 43rd Ave., Long Island City 1, N. Y.
• United States Air Conditioning Corp., 33rd & Como Ave., S. E., Minneapolis 14, Minn.
United States Gasket Co., 1518 Pierce Ave., Camden, N. J.
United States Gauge Div. of American Machine & Metals, Inc., Sellersville, Pa.
United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.
United States Mineral Wool Co., 10 S. LaSalle St., Chicago 3, Ill.
United States Ozone Co. of America, Crescent St., Scottdale, Pa.
United States Pipe & Foundry Co., Burlington, N. J.
United States Radiator Corp., 1500 United Artists Bldg., Detroit 31, Mich.
United States Register Co., Burnham St., Battle Creek, Mich.
United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y.
United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.
United States Steel Supply Co., 1319 W. Wabansia, Chicago, Ill.
United States Stoneware Co., 60 E. 42nd St., New York 17, N. Y.
Universal Air Filter Corp., 332 W. Michigan St., Duluth 2, Minn.
Universal Cooler, Div. of International Detrola Corp., 299 Joseph St., Marion, O.
Universal-Cyclops Steel Corp., Bridgeville, Pa.
Universal Gypsum & Lime Co., 111 W. Washington St., Chicago, Ill.
Universal Power Corp., 731 Carnegie Ave., Cleveland 15, O.
Universal Welder Corp., 731 Carnegie Ave., Cleveland 15, O.
Universal Zonolite Insulation Co., 135 S. LaSalle St., Chicago 3, Ill.
Uno Ventilator Co., 565 Lincoln Ave., Cliftondale, Mass.
Utica Products, Inc., Utica 4, N. Y.
Utica Radiator Corp., 2201 Dwyer Ave., Utica 2, N. Y.
Utility Appliance Corp., 4851 S. Alameda St., Los Angeles 11, Calif.
Utility Laboratory, Inc., 330 36th St., Brooklyn 32, N. Y.

Vanderman Mfg. Co., Mansfield Ave., Willimantic, Conn.
Van Dorn Electric Tool Co., Towson, Md.
Van Noorden Co., E., 100 Magazine St., Boston 19, Mass.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago 4, Ill.
Vapor Specialty Co., 101 W. 42nd St., New York 18, N. Y.
Ventilating Products Co., 2800 Cottage Grove Ave., Chicago, Ill.
Verson Allsteel Press Co., 93rd & Kenwood Ave., Chicago 19, Ill.
Vesco Corp., 1381 Sedgwick Ave., New York 52, N. Y.
Vibration Eliminator Co., 10-28 47th Ave., Long Island City 1, N. Y.
Victaulic Co. of America, 30 Rockefeller Plaza, New York 20, N. Y.
Victor Electric Products, Inc., 2950 Robertson Rd., Cincinnati 9, O.
Victor Equipment Co., 844 Folsom St., San Francisco 7, Calif.
Viking Air Conditioning Corp., 5600 Walworth Ave., Cleveland 2, O.
Viking Mfg. Corp., U. B. Bldg., 1747 Chester Ave., Cleveland 14, O.
Viking Pump Co., Fourth and Rouse Sts., Cedar Falls 1, Ia.
Viking Shear Co., 1063 W. 19th St., Erie, Pa.
Vilter Mfg. Co., 2148 S. First St., Milwaukee 7, Wis.
Vinco Co., Inc., The, 305 E. 45th St., New York 17, N. Y.
Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Virginia Smelting Co., West Norfolk, Va.
Vogt Machine Co., Henry, 1000 W. Ormsby St., Louisville 10, Ky.
Voss Co., J. H. H. 785 E. 144th St., Corner of Wales Ave., New York 54, N. Y.
Vulcan Electric Co., 88-90 Holten St., Danvers, Mass.
• Vulcan Radiator Co., 26 Francis Ave., Hartford 6, Conn.

Wade Mfg. Co., Elgin, Ill.
• Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.
Wailes Dove-Hermiston Corp., 441 South Ave., Westfield, N. J.
Waldron Corp., John, New Brunswick, N. J.
Walker Jamar Co., 367 S. First Ave., E., Duluth, Minn.
Wall Chemicals Div. of The Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23, Ill.
Wallace Supplies Mfg. Co., 1304 Diversey Pkwy., Chicago 14, Ill.
Wallace & Tiernan Co., Inc., P. O. Box 178, Newark 1, N. J.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Walsh Refractories Corp., 4070 N. First St., St. Louis 7, Mo.
Walton Co., 94 Allyn St., Hartford 3, Conn.
• Walworth Co., 60 E. 42nd St., New York 17, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Warlo Corp., 330 W. 42nd St., New York 18, N. Y.
Warner Bros. Co., Spiratube Div., Bridgeport 2, Conn.
Warren Electric Appliance Co., Warren Bank & Trust Co. Bldg., Warren, Pa.
Warren Foundry & Pipe Corp., 11 Broadway, New York 4, N. Y.
Warren Steam Pump Co., Inc., 300 Bridges Ave., Warren, Mass.
• Warren Webster & Co., 17th and Federal Sts., Camden, N. J.
Washburne & Co., E. G., 207 Fulton St., New York, N. Y.
Washington Steel Corp., Washington, Pa.
Water Cooling Corp., 71 Nassau St., New York 7, N. Y.
Water Cooling Equipment Corp., New Hampshire Ave. & Weber Rd., Affton Station, St. Louis 23, Mo.
Water Cooling Tower Co., 5501 Cornell Ave., Chicago, Ill.
Water Refining Co., 1123 Barthold, Ft. Wayne, Ind.
Water Service Laboratories, Inc., 423 W. 126th St., New York 27, N. Y.
Water Treatment Company of America, 1159 Hodgkiss St., Pittsburgh 12, Pa.
Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City 7, N. J.
• Waterloo Register Sales Co., Jefferson & W. Mullan St., Waterloo, Iowa.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia 23, Pa.
Watson-Standard Co., 225 Galveston Ave., Pittsburgh 30, Pa.
• Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Wattenamel Co., 7400 Archer Ave., Summit, Ill.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Waukesha Motor Co., Waukesha, Wis.
Waverly Heating Supply Co., 31 Union St., Boston 8, Mass.
Way Loctor Access Panel Co., 420 Boylston St., Boston 16, Mass.
Wayne Davies & Co., Westboro, Mass.
• Weather Controls Div., Automatic Devices Co., 53 W. Jackson Blvd., Chicago 4, Ill.
Weatherhead Co., 300 E. 131st St., Cleveland 8, O.
Weaver Mfg. Co., Springfield, Ill.
• Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Webster Electric Co., S. W. Corner Clark & De Koven Aves., Racine, Wis.
• Webster Engineering Co., 419 W. Second St., Tulsa 1, Okla.
• Webster Tallmadge & Co., 364 Glenwood Ave., East Orange, N. J.
Wedge Protectores, Inc., 9522, Richmond Ave., Cleveland 5, O.
Weil-McLain Co., 641 W. Lake St., Chicago 6, Ill.
Weil Pump Co., 1528 N. Fremont St., Chicago 22, Ill.
Weinman Pump Mfg. Co., The, 290 W. Spruce St., Columbus 8, O.
• Weirton Steel Co., Weirton W. Va.
Weiss & Co., H., 113-115 Mercer St., New York, N. Y.
Weksler Thermometer Corp., 52-56 W. Houston St., New York 12, N. Y.
Weldex, Inc., 7326 McDonald Ave., Detroit, Mich.
Welding Apparatus Co., 2750 W. Van Buren St., Chicago, Ill.
West Coast Electrical Mfg. Co., 10010 S. Main St., Los Angeles 3, Calif.
Western Blower Co., 1800 Airport Way, Seattle 4, Wash.
Western Brass Mills Div. of Olin Industries, Inc., East Alton, Ill.
Western Chemical Co., 713 Washington St., Kansas City 6, Mo.
Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles 21, Calif.
Western Felt Works, 4029-4117 Ogden Ave., Chicago 23, Ill.
Western Hanger Co., 55 New Montgomery St., San Francisco, Calif.
Western Mineral Products Co., 2602 Ed Creighton Ave., Omaha 1, Nebr.
Western Piping & Engineering Co., 119 Kansas St., San Francisco 3, Calif.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.
• Western Thermal Equipment Co., 1701 W. Slauson Ave., Los Angeles 44, Calif.
Western Wire & Iron Works, Inc., 957 W. 18th Pl., Chicago 8, Ill.
Western Wire Products Co., 1415-35 S. 18th St., St. Louis 4, Mo.
Westinghouse Electric Corp., Bloomfield, N. J.
Westinghouse Electric Corp., Cleveland, O.
Westinghouse Electric Corp., East Pittsburgh, Pa.
Westinghouse Electric Corp., Heating Section, Meadville, Pa.
Westinghouse Electric Corp., 653 Page Blvd., Springfield, Mass.
Westinghouse Electric Corp., X-Ray Div., 2519 Wilkens Ave., Baltimore, Md.
Weston Electrical Instrument Corp., 619 Frelinghuysen Ave., Newark 3, N. J.
• Wheatland Tube Co., 606-608 Real Estate Trust Bldg., Philadelphia 7, Pa.
Wheelco Instruments Co., Harrison and Peoria Sts., Chicago 7, Ill.
Wheeler Mfg. Co., C. H., 1739 Sedgley Ave., Philadelphia 32, Pa.
Wheeling Machine Products Co., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, W. Va.
White Flo-Matic Corp., 1 Mechanic St., Hoosick Falls, N. Y.
White Mfg. Co., 2362 University Ave., St. Paul 4, Minn.
• White-Rodgers Electric Co., 1209 Cass Ave., St. Louis 6, Mo.
Whiting Corp., Harvey, Ill.
Whiting Stoker Sales Co., 11 S. La Salle St., Chicago 3, Ill.
• Whitlock Mfg. Co., 100 South St., Hartford 1, Conn.
Whitney Chain & Mfg. Co., The, 237 Hamilton St., Hartford 2, Conn.
Whitney Mfg. Co., W. A., 636 Race St., Rockford, Ill.
Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill.
Whittaker Co., Wm. R., 915 N. Citrus, Los Angeles, Calif.
Whittington Pump & Engineering Co., 245 S. Meridan St., Indianapolis 4, Ind.
Whitty Co., Inc., 86 Western Ave., Boston 34, Mass.
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich.
Wickes Bros., 500 N. Tilden St., Saginaw, Mich.
Wickwire Spencer Steel, Div. of Colorado Fuel & Iron Corp., 361 Delaware Ave., Buffalo 2, N. Y.
Wiedeman Machine Co., 1815 Sedgley Ave., Philadelphia 32, Pa.
• Wiegand Co., Edwin L. 7610 Thomas Blvd., Pittsburgh 8, Pa.
Wiggins Oil Tool Co., Inc., E. B., 3424 E. Olympic Blvd., Los Angeles 23, Calif.
Wilbur & Williams Co., Greenleaf & Leon Sts., Boston 15, Mass.
Wilcolator Co., 1001 Newark Ave., Elizabeth B, N. J.

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Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
Will Corp., 35 Russell St., Rochester 3, N. Y.
Will-Burt Co., The, Orrville, O.
Williams & Co., J. H., Buffalo 7, N. Y.
Williams Gauge Co., 1620 Pennsylvania Ave., N. S., Pittsburgh 12, Pa.
Williams, Inc., F. C., 6661 Chase Rd., Dearborn, Mich.
Williams Oil-O-Matic Div., Eureka Williams Corp., 1201 East Bell, Bloomington, Ill.
Williams & Son, I. B., Dover, N. H.
Williams Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati 25, O.
Williamson Heater Co., 4558 Marburg Ave., Cincinnati 9, O.
Williamsport Engine & Machine Co., 1306 Memorial Ave., Williamsport, Pa.
Willis Steel Corp., 156 N. Academy St., Galesburg, Ill.
Willson Products, Inc., 348 Thorn St., Reading, Pa.
Will-Weld Mfg. Co., Inc., 600-620 S. 15th St., Omaha 2, Nebr.
Wiley's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich.
● Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago 9, Ill.
Wilson Co., H. A., The, 105 Chestnut St., Newark, N. J.
Wilson Co., K. R., 215 Main St., Buffalo, N. Y.
● Wilson, Inc., Grant, 141 W. Jackson Blvd., Chicago 4, Ill.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17, N. Y.
Wind-Way Fan & Ventilator Co., 527 St. Joseph St., New Orleans 13, La.
● Wing Mfg. Co., L. J., 14th St. & 7th Ave., New York 11, N. Y.
Winkler & Sons, Inc., A. E., 2337 N. 31st St., Milwaukee 10, Wis.
Winslow Engineering Co., 4069 Hollis, Oakland 8, Calif.
Wipe-On Corp., 50 Jay St., Brooklyn 1, N. Y.
Wiremold Co., The, Hartford 10, Conn.
Wiss & Sons Co., J., 33 Littleton Ave., Newark 7, N. J.
Witte Engine Works, Div. of Oil Well Supply Co., 1600 Oakland St., Kansas City 3, Mo.
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago 51, Ill.
Wodack Electric Tool Corp., 4627 W. Huron St., Chicago 44, Ill.
Wolfe-Kote Co., 705 Center Ave., Sheboygan, Wis.
● Wolverine Tube, Div. of Calumet and Hecla Consolidated Copper Co., 1411 Central Ave., Detroit 9, Mich.
Wood Conversion Co., 1981 First National Bank Bldg., St. Paul 1, Minn.
Wood Steel Co., Alan, Conshohocken, Pa.
Wood's Sons Co., T. B., 1275 Fifth Ave., Chambersburg, Pa.
Worner Electronic Devices, Rankin, Ill.
● Worthington Pump & Machinery Corp., Harrison & Worthington Sts., Harrison, N. J.
● Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
Worthington-Gamon Meter Co., Harrison, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit 26, Mich.
Wyckoff & Son Co., A., 100 Home St., Elmira, N. Y.

● X Laboratories, Inc., 25 W. 45th St., New York 19, N. Y.
X L Refrigerating Co., 1834 W. 59th St., Chicago 36, Ill.
X-Pando Corp., 43-15 36th St., Long Island City 1, N. Y.

Yale & Towne Mfg. Co., Stamford, Conn.
Yardley Plastics Co., 138 Parsons Ave., Columbus 15, O.
● Yarnall-Waring Co., 107 Mermaid Ave., Philadelphia 18, Pa.
Yates-American Machine Co., Beloit, Wis.
Yeomans Bros. Co., 1433 N. Dayton St., Chicago 22, Ill.
Yoder Co., The, 5500 Walworth Ave., Cleveland 2, O.
York Corp., Roosevelt Ave., York, Pa.
York Corrugating Co., Adams St. & W. M. R. R., York, Pa.
York Electric & Machine Co., 30-34 N. Penn St., York, Pa.
York-Heat Div., York-Shipley, Inc., P. R. R. & Jessop Pl., York, Pa.
York-Shipley, Inc., Industrial Div., York, Pa.
Yost Mfg. Co., Meadville, Pa.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati 14, O.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.
Young Regulator Co., 5209 Euclid Ave., Cleveland 3, O.
● Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown 1, O.

● Zallea Brothers & Johnson, Taylor and Locust St., Wilmington 99, Del.
Zapon Div., Atlas Powder Co., North Chicago, Ill.
Zeh & Hahnemann Co., 182-200 Vanderpool St., Newark 5, N. J.
Zenith Electric Co., 152 W. Walton St., Chicago 10, Ill.
● Zink Co., John, P. O. Box 310, Tulsa 1, Okla.

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